RESOURCE ASSESSMENT FOR COASTAL AND WESTERN BRITISH COLUMBIA AND THE DEVELOPMENT OF A PORTABLE MODULAR MILL DESIGN

Prepared for:

TRADER RESOURCE CORP. - FLEET DEVELOPMENT LTD.
AND
MINISTRY OF ENERGY, MINES AND
PETROLEUM RESOURCES
UNDER THE CANADA-BRITISH COLUMBIA MINERAL DEVELOPMENT
SUBSIDIARY AGREEMENT

Prepared by:

TRM ENGINEERING LTD.
#701 - 744 West Hastings Street
Vancouver, British Columbia
V6C 1A5

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90-00191/

PREFACE

This report entitled "Resource Assessment for Coastal and Western British Columbia and the Development of a Portable Modular Mill Design" was commissioned by the Ministry of Energy, Mines and Petroleum Resources and Trader Resource Corp. in December 1985.

Funding of the project was provided in part by the Department of Energy, Mines and Resources of Canada and the Ministry of Energy, Mines and Petroleum Resources of British Columbia under the Canada-British Columbia Mineral Development Subsidiary Agreement and by Trader Resource Corp. and Fleet Developments Ltd. The project work was contracted to TRM Engineering Ltd. under the direction of M. McClaren.

The project is based upon the concept of establishing a design for a modular constructed portable concentrating facility. Such a facility could be utilized in the processing of various ores within the coastal and adjacent areas of western British Columbia.

The Resource Assessment portion of this report has investigated the distribution of deposits within the study area with an emphasis on precious metal deposits, particularly those with a significant gold content.

The study has indicated that eight deposits may benefit from the use of a portable mill. Three sample plants have been designed to process ores at rates of 70 MTD (75 TPD) and 230 MTD (250 TPD). Capital and operating costs of these plants have been calculated based upon flowsheet requirements.

Detailing of a 50 MTD and 100 MTD truck transportable mill is provided such that components may be individually selected and priced. Capital and operating costs can be calculated from tables and examples provided.

The information in this report should form the basis from which further work can be undertaken to develop and implement this type of milling facility.

We are indebted for co-operation to the mining companies, British Columbia Ministry of Energy, Mines and Petroleum Resources and the Geological Survey of Canada.

M. McClaren
Principal
TRM Engineering Ltd.

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PART I

RESOURCE ASSESSMENT FOR COASTAL AND WESTERN BRITISH COLUMBIA

PART I

RESOURCE ASSESSMENT FOR COASTAL AND WESTERN BRITISH COLUMBIA

RESOURCE ASSESSMENT

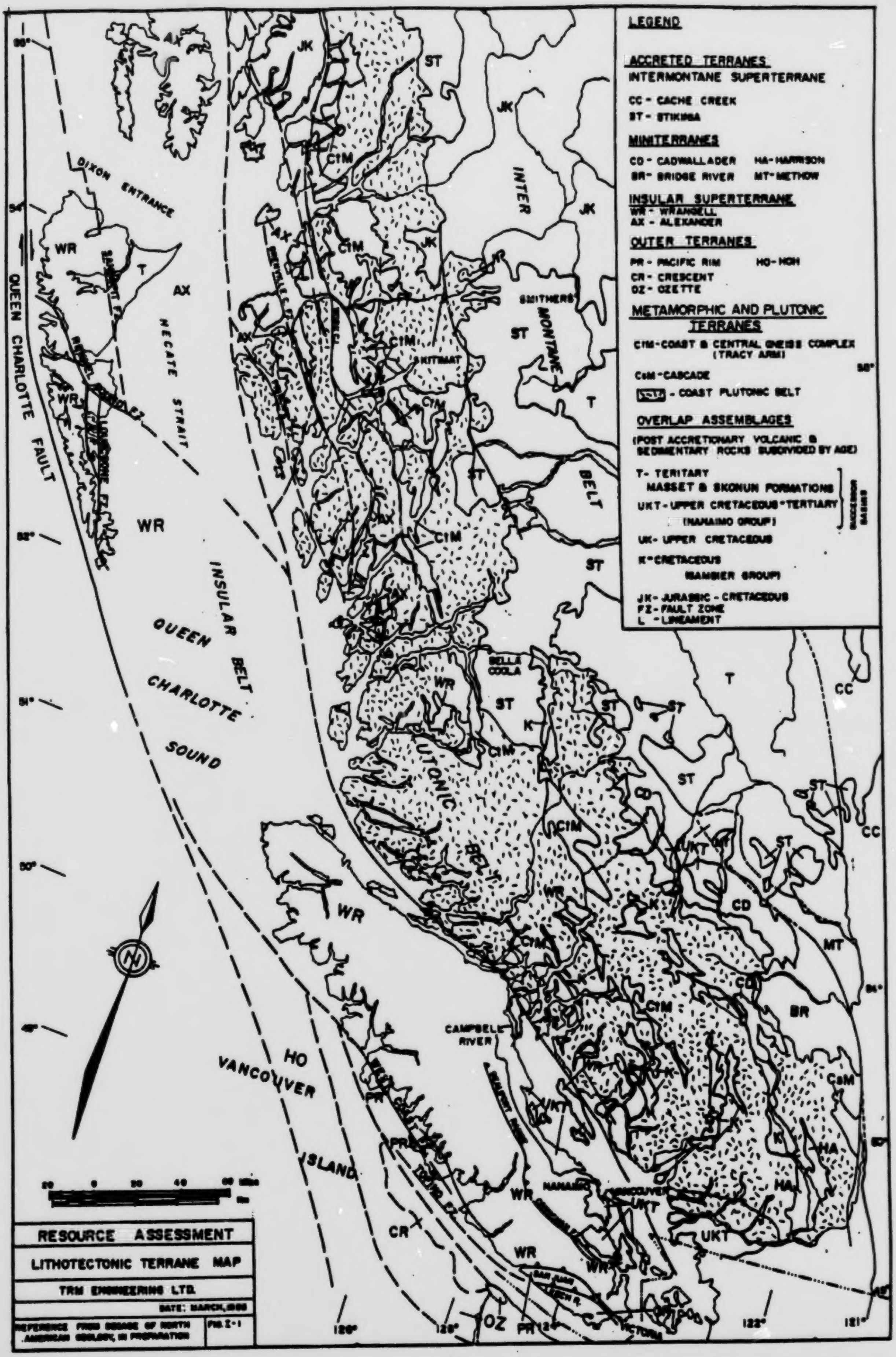
PART I

1.0 GEOLOGICAL FRAMEWORK

A. SUTHERLAND BROWN

The area of resource appraisal related to the development of a portable mill is governed by ready ocean access, either directly or by short road haul. Geographically this equates to the fiordland and island fringe of the Coast Mountains together with Vancouver and the Queen Charlotte Islands (see Figure I-2).

The complex geology of this extensive area (40,000 mi^2 / 15,500 km^2) can most simply be discussed in terms of both the five longitudinal Tectonic Belts of the Cordillera and the stratigraphic sequences in terms of the allochthonous terranes that accreted to North America to form the western part of the mountain belt (see Figure I-1). The details regarding the site of origin, development and suturing to the continent are still being worked out but the known data provide a useful framework.


LEGEND
ACCRETED TERRANES
INTERMONTANE SUPERTERRANE
CC - CACHE CREEK
ST - STIKINA
MINITERRANES
CD - CADWALLADER
HA - HARRISON
BR - BRIDGE RIVER
MT - METHOW
INSULAR SUPERTERRANE
WR - WRANGELL
AX - ALEXANDER
OUTER TERRANES
PR - PACIFIC RIM
HO - HOH
CR - CRESCENT
OZ - OZETTE
METAMORPHIC AND PLUTONIC TERRANES
CIM - COAST & CENTRAL GNEISS COMPLEX (TRACY ARM)
CsM - CASCADE
- COAST PLUTONIC BELT
OVERLAP ASSEMBLAGES
(POST ACCRETIONARY VOLCANIC & SEDIMENTARY ROCKS SUBDIVIDED BY AGE)
T - TERITARY
MASSET & SKONUN FORMATIONS
UKT - UPPER CRETACEOUS - TERTIARY
(NANAIMO GROUP)
SUCCESSOR BASINS
UK - UPPER CRETACEOUS
K - CRETACEOUS
(GAMBIER GROUP)
JK - JURASSIC - CRETACEOUS
FZ - FAULT ZONE
L - LINEAMENT
DIXON ENTRANCE
HECATE STRAIT
QUEEN CHARLOTTE FAULT
QUEEN CHARLOTTE SOUND
INSULAR BELT
INTERMONTANE BELT
PLUTONIC BELT
VANCOUVER ISLAND
SMITHERS
KITIMAT
BELLA COOLA
CAMPBELL RIVER
NANAIMO
VANCOUVER
VICTORIA
SAN JUAN
LEECH R.
WR
AX
T
JK
ST
CIM
CD
MT
BR
CsM
HA
K
UKT
CC
HO
PR
CR
OZ
54°
52°
51°
50°
49°
56°
55°
50°
48°
126°
128°
124°
122°
121°
N
20
0
20
40
60 Miles
Km

RESOURCE ASSESSMENT

LITHOTECTONIC TERRANE MAP

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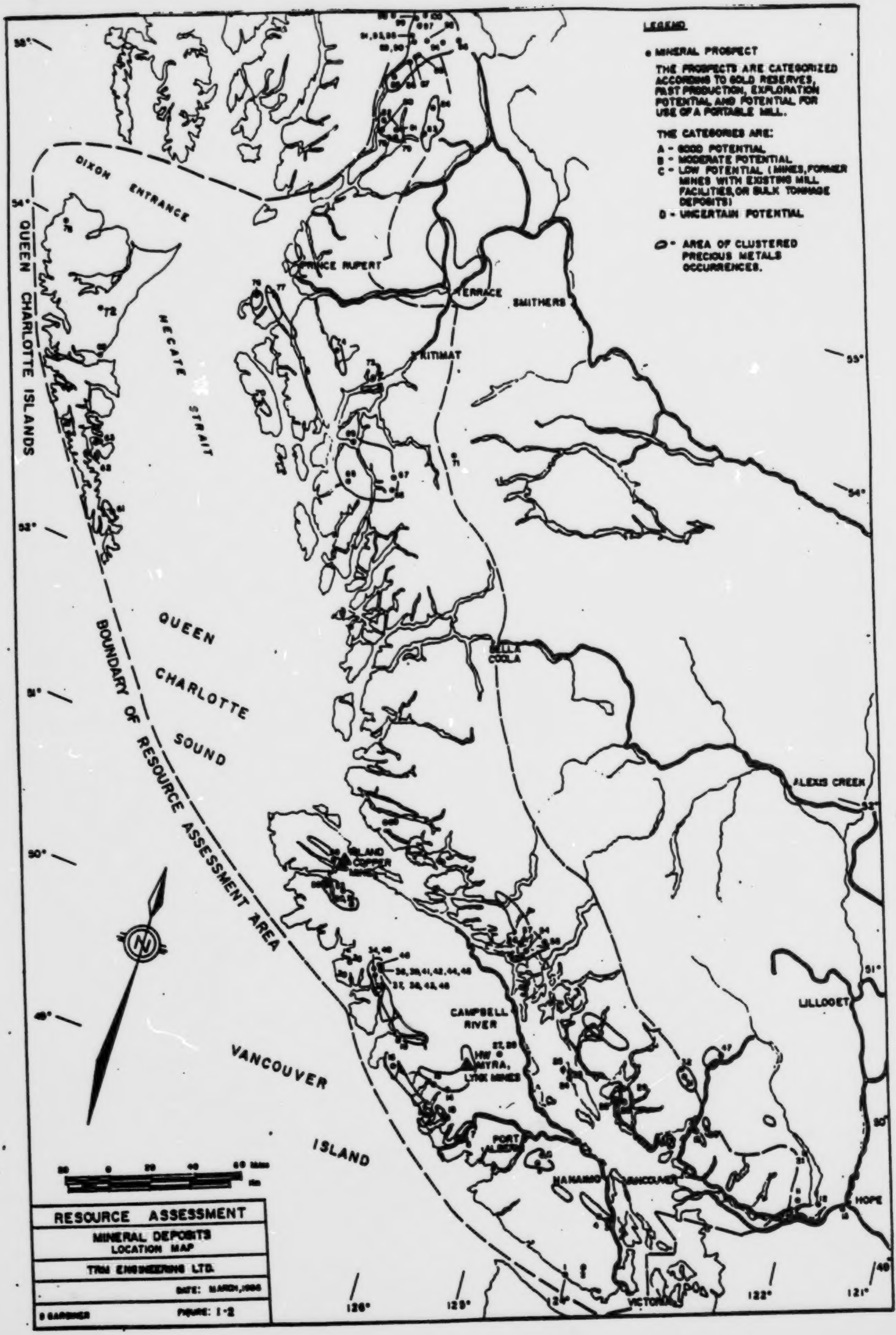
DATE: MARCH, 1988

REFERENCE FROM DECADE OF NORTH AMERICAN GEOLOGY, IN PREPARATION

FIG. I-1


DIXON ENTRANCE
QUEEN CHARLOTTE ISLANDS
HECATE STRAIT
QUEEN CHARLOTTE SOUND
VANCOUVER ISLAND
BOUNDARY OF RESOURCE ASSESSMENT AREA
PRINCE RUPERT
TERRACE
SMITHERS
KITIMAT
BELLA COOLA
ALEXIS CREEK
ISLAND COPPER MINES
CAMPBELL RIVER
HW MYRA, LYNX MINES
PORT ALBERNI
NANAIMO
VANCOUVER
VICTORIA
LILLOOET
HOPE
N
55°
54°
53°
52°
51°
50°
49°
126°
125°
124°
122°
121°
20 0 20 40 60 Miles
Km

LEGEND

● MINERAL PROSPECT

THE PROSPECTS ARE CATEGORIZED ACCORDING TO GOLD RESERVES, PAST PRODUCTION, EXPLORATION POTENTIAL AND POTENTIAL FOR USE OF A PORTABLE MILL.

THE CATEGORIES ARE:

A - GOOD POTENTIAL
B - MODERATE POTENTIAL
C - LOW POTENTIAL (MINES, FORMER MINES WITH EXISTING MILL FACILITIES, OR BULK TONNAGE DEPOSITS)
D - UNCERTAIN POTENTIAL

⬭ - AREA OF CLUSTERED PRECIOUS METALS OCCURRENCES.

RESOURCE ASSESSMENT

MINERAL DEPOSITS
LOCATION MAP

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DATE: MARCH, 1986

B GARDNER FIGURE: 1-2

IND.	PROPERTY NAME	CAT.												
1	SUNRO MINE	B	23	CAMBRIAN CHIEFTAN	B	45	CENTRAL ZEBALLOS	D	67	HUNTER	A	88	DUNWELL	B
2	VALENTINE MT.	D	24	HOLLY	C	46	KING MIDAS	A	68	SOUTHEASTER	D	89	WOODBINE	C
3	MOUNT SICKER	B	25	TEXADA ISLAND	B	47	WARMAN NORTHAMS	B	69	OX	D	90	SILBAK PREMIER	D
4	LARA	D	26	MARJORIE	D	48	COPPER ROAD	B	70	YELLOW GIANT	A	91	INDIAN	B
5	THISTLE	B	27	MT WASHINGTON GOLD	B	49	LUCKY JIM	B	71	SMITH-NASH	B	92	RED CLIFF	B
6	LEORA, DONALD	B	28	MT WASHINGTON COPPER	C	50	INDEPENDENT	B	72	CINOLA	C	93	SILVER BUTTE	B
7	ROSE MARIE	D	29	SHOOKUM (CHALICE)	D	51	COAST COPPER	B	73	DRUMLUMMON	D	94	GEORGE AU-CU	B
8	VICTORIA	D	30	PORT ELIZA GOLD MINE	B	52	THURLOW GOLD	C	74	ECSTALL	B	95	BIG MISSOURI	C
9	KALLAPA	D	31	ASHLU	A	53	ALICE LAKE MINES	B	75	INCONSPICUOUS	B	96	GOAT	B
10	FANDORA	B	32	ICE, VALAKUS	D	54	DOUGLAS PINE	B	76	EDYE PASS	A	97	TROY	B
11	AGASSIZ-WEAVER	A	33	BEANO	D	55	YREKA	B	77	JITNEY	D	98	GRANDUC MINE	C
12	BN MINE	C	34	TAGORE	D	56	ALEXANDRIA	B	78	BONANZA, BLACK BEAR	A	99	SCOTTIE GOLD	C
13	AUFEAS	D	35	FR. ML.	D	57	DORATHA-MORTON	B	79	GRANBY POINT	D	100	EAST GOLD	D
14	PROSPER	D	36	MT. ZEBALLOS	D	58	COLOSSUS	B	80	MAPLE BAY GROUP	C			
15	HERBERT INLET	D	37	SPUD VALLEY	D	59	CALEDONIA	D	81	ANYOX HIDDEN CR.	C			
16	INDIAN CHIEF	B	38	HOMEWARD	B	60	SILTA	B	82	OUTSIDER GROUP	B			
17	COPPER BAY	C	39	ZEBALLOS PACIFIC	A	61	IKEDA MINE	B	83	ESPERANZA	D			
18	BRITANNIA	C	40	VAN ISLE	B	62	HIGH GRADE	B	84	DOLLY VARDEN	C			
19	DANZIG	B	41	WHITE STAR	D	63	APRIL	C	85	GEORGIA R. GOLD	A			
20	WAR EAGLE (MAGGIE)	A	42	C.D.	B	64	TASU	D	86	PROSPERITY-PORTER (IDAHO)	C			
21	DOCTORS POINT	B	43	RIMY	B	65	SURF INLET	D						
22	KING MIDAS	B	44	PRIVATEER	B	66	WESTERN COPPER	D	87	LUCKY SEVEN	B			

The appraisal area includes all of the westernmost Insular Belt, much of the south and central Coast Plutonic Belt and a small part of the Intermontane Belt. The geology of the Insular and Coast Plutonic Belts is radically different. The Insular Belt is dominated by volcanic and sedimentary rocks of Wrangellia; whereas the Coast Plutonic Belt is overwhelmingly composed of intrusive granitic rocks with metamorphosed inliers that reveal a ±ghost' stratigraphy of three terranes - Wrangellia, Stikinia and the Alexander Terrane. The small part of the Intermontane Belt included here is underlain by Stikinia.

1.1 INSULAR BELT

The Insular Belt is mainly completely composed of Wrangellian terrane which is overwhelmingly composed of volcanic rocks, derived sediments, and related intrusive rocks with lesser carbonates. Wrangellia was constructed from three superposed volcanic piles ranging in age from early Paleozoic to early Jurassic. The oldest assemblage is the late Silurian to Permian Sicker Group, a marine calcalkaline arc dominated by basaltic to andesitic agglomerates but with dacites and rhyolites in its upper part, and topped by a thick crinoidal limestone (Buttle Lake Formation). This group is overlain with mild unconformity by a very thick sequence of uniform, rift related, basaltic pillow lavas of Late Triassic age on which another thick limestone rests (Quatsino Formation). The third pile, the Bonanza Group, of Lower Jurassic age formed an emergent arc of intermediate to acid pyroclastic rocks. Genetically related, but slightly younger, are the Island Intrusions and West Coast Complex of quartz diorite to granodioritic composition.

Two minor terranes exist at the south and west of Vancouver Island where they are juxtaposed against and thrust under Wrangellia. These respectively are the late Jurassic early Cretaceous slope deposits of the Pacific Rim Complex and the Eocene rift and basaltic pillow lavas of the Metchosin (Crescent) Formation. In addition, basins were formed and filled by younger clastic sequences on Wrangellian geology. On the Queen Charlotte Islands sandstone, shale, and conglomerate (Queen Charlotte Group) were deposited in the mid-Cretaceous, and on Vancouver Island similar rocks (Nanaimo Group) were deposited in the Late Cretaceous.

Further magmatic events took place in the belt in the Tertiary Period. On the Queen Charlotte Islands a very thick bimodal suite of basalt and rhyolite was deposited subaerially in mid-Tertiary times, possibly related to transverse rifting. Oligocene granite porphyries intrude these and Wrangellian rocks. On Vancouver Island Tertiary volcanism was minor but an extensive group of porphyritic granities, Catface Intrusions, were intruded in Eocene and later times.

Under late Tertiary sands and shales of NE Graham Island and Hecate Strait the basement rocks are typical of Alexander Terrane.

1.2 COAST PLUTONIC BELT

Eighty-five percent of the Coast Plutonic Belt is composed of granitic rocks which occur as discrete or semi-discrete plutons in a matrix of schist and gneiss. The plutons may be low level ones rooted to their protolith or high level, discordant homogeneous or zoned bodies. There is a gradient in composition from sodic-quartz diorite in the west to granodiorite and granite in the east. Magmatism was episodic and protracted. The main intrusive period lasted through most of the Cretaceous from about 120 Ma (million years ago) to 85 Ma, but was followed by two discrete later pulses at 70 ± 10 Ma, and 50 ± 5 Ma. The plutonism is widely regarded as evidence of heat generation on collision and suturing of the outboard terranes (Wrangellia and Alexander) on the inboard (Stikinia, etc.).

Study of the metamorphic hosts, now evident as pendants and inliers, and which may be both intruded and protolith, enables tentative identification from the ghost stratigraphy of the terrane of origin. In the study area most inliers south of Burke Channel can be assigned a Wrangellian origin. North of Burke Channel and west of Work Channel lineament, inliers and pendants are fairly certainly part of Alexander Terrane whereas east of the lineament they appear to be part of Stikinia. The prominent Central Gneiss Complex (Tracy Arm) may be a highly deformed and metamorphosed amalgam of Stikinia and Alexander Terranes unconformably overlain by an overlap assemblage equivalent to the Gravina-Nutzotin rocks of southeast Alaska. In the Southern Coast Plutonic Belt inliers of the Gambier Group may also be correlative with the foregoing rocks. In addition, adjacent to the Fraser Valley and Harrison Lake are three mini terranes - Harrison Lake, Shuksan and Chilliwack.

The Alexander Terrane in adjacent Southeast Alaska is composed of Carboniferous carbonate and clastic sediments unconformably overlain by Upper Triassic limestone and Lower and Middle Jurassic felsic to intermediate volcanic rocks. Stikine Terrane in the Intermontane Belt near Stewart is predominantly composed of Lower and Middle Jurassic emergent arc andesitic and rhyolitic pyroclastic rocks but these represent the youngest of the terrane rocks. The Gravina-Nutzotin assemblage is a Jurassic and Late Cretaceous sequence of marine volcanic rocks and intercalated sediments. The Gambier Group is equivalent in age and consists of a lower pyroclastic sequence dominated by andesite and dacite overlain by an upper sequence of argillite, greywacke and tuff.

1.3 STRUCTURE

The structural style of the Insular Belt is very different from that of the Coast Plutonic Belt. The gross structure of Vancouver Island is a geanticline cored by the oldest rocks - the Sicker Group - and flanked by the Karmutsen Formation, then alternately by the Bonanza and Nanaimo Groups. This simple, long-lived structure reflects original centres of volcanic accumulation of the Sicker Group reactivated by folding and thrust faulting that continued to at least the late Cretaceous. A similar geanticlinal structure is not as evident in the Queen Charlotte Islands largely because the western side is truncated and the whole imbricated by wrench faults.

Major northwest striking faults of the Belt include the Tofino, West Coast, Cowichan Lake-Beaufort Range Thrust on Vancouver Island and the Queen Charlottes, Louscoone, Rennel Sound, and Sandspit Faults on the Charlottes. Late northerly striking faults, an order of magnitude smaller, are also important. Wrangellia is bounded on the south by the north-dipping thrusts of the San Juan and Leech River Faults. Many small northeast dipping thrusts on southern Vancouver Island are believed related to Eocene and younger subduction.

In the Coast Plutonic Belt the early structures of the terranes are largely obliterated. However, the Work Channel Lineament and/or the western edge of the Central Gneiss Complex probably originated as the suture of Alexander Terrane against Stikinia. Late structures are dominated by great lineaments now largely covered by water, e.g. Work Channel, Grenville Channel, Principe Channel. These faults not only appear to have been active in right lateral translation of the western Coast Mountains but also in the uplift of the core in the Eocene and later times.

The relationship of the distribution of mineral deposits to geological structures is moderately strong but is also subtle. Certainly the distribution of favourable hosts for syngenetic deposits, such as the upper Sicker volcanic rocks, is governed by it. Also the juxtaposition of plutons, carbonate rocks and sources of metals for skarn deposits is structurally controlled, particularly the location of the plutons and of the minor faults and breccia zones which served as the conduits. Finally, there is a particularly close relationship for epigenetic vein deposits and the major lineaments and their subsidiary splays. There is also a very close relationship between the Tertiary intrusives that are host to porphyry deposits and related precious metal veins because these plutons are introduced along major northwesterly faults.

1.4 METALLOGENY

Statistical analysis of the distribution of all known metallic mineral occurrences of Cordilleran British Columbia shows the Insular Belt to have the highest density of occurrences per unit area of any belt - 15.4 occurrences per 1,000 km^2 compared to 7.91 for the Cordillera as a whole. In contrast, the Coast Plutonic Belt is slightly below average, having 6.13 occurrences per 1,000 km^2. The plutonism and high thermal regimes of the belt have probably depleted the favourable geology of the original volcanic terranes of metals.

In contrast to the difference in intensity of mineralization in the two belts the type of mineralization is rather similar. Both belts are characterized by volcanogenic massive sulphide and by extensive lode gold deposits. The characteristic minerals of each belt - i.e.

those minerals in which the occurrence density is greater than the average for the Cordillera - are as follows: Insular Belt - Cu, Au, Zn, As, Co; and for the Coast Plutonic Belt - Au, Ni, Hg, Mo, As.

Statistical analysis of the Intermontane Belt as a whole is not applicable to the small part of it on the fringe of the Coast Plutonic Belt in the Stewart area. Indeed this has a very high density of deposits of types similar to Insular and Coast Belts, i.e. volcanogenic massive sulphide, vein lodes and skarns. In addition, the area contains many silver and lead-rich deposits.

1.5 DISTRIBUTION

The distribution of all known occurrences that contain significant precious metals in veins, polymetallic massive sulphide, or skarn deposits is not uniform but highly clustered. Major prospects commonly, but not invariably, occur within clusters of occurrences (see Figure I-2). The distribution of clusters themselves is not uniform. In the Coast Plutonic Belt between Aristazabal Island and Knight Inlet there are no clusters or significant prospects. The Insular Belt of these latitudes is covered by Queen Charlotte Sound.

The origin of the clusters in some instances is as simple as the surface exposure of a favourable host; in others contact zones of plutons or proximity to major lineaments. Others are less explicable.

1.6 GEOCHEMISTRY

Sequences of rocks may have charateristic geochemical signatures and/or characteristic deposit types. In Wrangellia the upper part of the volcanic sequence of the Sicker Group is a notable host to arc-type volcanogenic massive sulphide deposits rich in precious metals, e.g. Lynx, Myra, Price, H-W, Lara, and Mt. Sicker. Similar types of deposits are also common in the emergent volcanic arcs of the Hazelton Group of Stikinia - e.g. Hidden Creek, Bonanza, Redwing, Double Ed and Granduc; and the overlap assemblages of Tracy Arm and Gambier Group - e.g. Ecstall and Britannia.

The Karmutsen Formation has a high background in copper and gold and is rich in iron. Rift-type volcanogenic deposits are not known to be significant in this unit but it is thought to be a source of metals in skarn deposits in and adjacent to the Quatsino Formation. Vein gold deposits are also common in the Karmutsen Formation.

The Coast Plutonic Belt is somewhat depleted in metals but deeply circulating hydrothermal waters, channelled by major faults that are commonly developed along inliers, have scavenged metals to form both Tertiary lodes and recent hotspring deposits.

The Tertiary granite porphyry plutons of the Insular Belt have also probably recycled and concentrated metals previously dispersed, leading to vein deposits like Zeballos, Mt. Washington, and Cinola.

2.0 MINERAL DEPOSITS

S. GARDINER

2.1 INTRODUCTION

This section of the report summarizes an inventory of the precious metal bearing mineral deposits of the coastal and adjacent areas of British Columbia.

The study has two interrelated purposes:

(i) to identify deposits which could utilize a portable modular mill and

(ii) to enable the facility to be designed on the basis of characteristics of these deposits

The inventory is a compendium of geological, geographical and historical information on 100 mineral properties and is presented as a reference guide to the exploration history of the study area.

2.2 PROCEDURE

The objective of the study was to compile information on properties with known reserves in which gold is either the primary, or significant secondary, metal of value. The investigation began with a review of government publications and mining industry periodicals to identify prospects which met these criteria. The prospects were then discussed with government geologists who provided information on exploration potential and current owner/operator status. Mining industry representatives were contacted for additional information on specific properties. A comparative check was made of data gathered from the literature and data gathered from other sources. Details on access, environment, claim status, ownership, history, geology, reserves, mining type, exploration potential and metallurgical testing have been entered on an interview/data sheet and related comments are included in Appendix D. The information has been collated and used to rate the deposits according to their potential for use of a portable modular mill.

The properties were divided into the following four categories:

Category A - Properties with reserves of moderate tonnage (20,000 to several 100,000 tonnes) and of moderate to high gold grade. Considered to have good potential for use of the portable mill.

Category B - Properties with low reserves but moderate gold grade. Prospects with reserves of moderate tonnage and low gold grade. Prospects with no reserves presently outlined but with a past production of more than 1,000 tonnes and a significant gold yield. The properties should have a good exploration potential. Considered to have a moderate potential for use of the portable mill.

Category C - Properties with large tonnages, those defined as bulk mining deposits or those that have milling facilities on-site. Considered to have a low potential for use of a portable mill facility.

Category D - Properties that can be considered exploration targets of some merit, but have no reserves and little or no production history. Uncertain potential for use of the portable mill.

2.3 PRESENTATION OF DATA

This report is divided into sections, according to prospect category. Information is presented in a table format. Case studies for five properties from Category A are presented. Three properties, Fandora #10, Privateer #44, and Georgia River Gold #85, are not included in the case studies and ample published information is available on these deposits. In the map section and appendices of the report are 1:300,000 scale location maps and data sheets for prospects in Categories A and B.

The tables and data sheets summarize the information gained from the resource study (i.e. location, access, environment, geology and mineralogy, reserves and history of exploration, mining and metallurgical testing). Direct references to this information are included in Sections 2.3.1 to 2.3.4. A general discussion is included below.

Each property included in this study has moderate to good exploration potential as indicated by available information.

In general, for those properties in which a good potential for the use of a portable mill exists, more detailed information is given.

Environmental data has been given only for properties of Category A. Other than in the Stewart area, where former producers such as Goat (#96) were restricted to seasonal operations due to high snowfall, the environment of the study area does not appear to be prohibitive to year-round mining and milling operations. This general statement is illustrated by the environmental statistics as shown on the data sheets in Appendix A.

Details on access are included for Categories A and B. Many of these deposits are close to existing transportation routes, either road or water. Others, such as Ecstall and Hunter, would require road building to be done to provide access.

Brief descriptions of geology and mineralogy have been included for deposits of moderate to good potential. Exploration history for these deposits and those of Category D has also been presented. Many deposits of Category D have had some production in the past and brief descriptions of the mining method and, where applicable, milling facilities used is included in the exploration history. In addition, if metallurgical studies were available, they have been briefly described in the history. References to mining type and metallurgical reports collected for deposits of Category C are included in Appendix E. At least 60% of the deposits have used or can be expected to use underground mining techniques. A few deposits have had a small amount of production from surface cuts. Twelve deposits have been evaluated in recent years as being best exploited by open pit/bulk mining methods.

Appendix E is a listing of the 100 deposits with accompanying references. This information includes mineral inventory and NTS designations as well as references to literature, and owner, operator or consultant.

2.3.1 Category A - Properties of Good Potential

Eight properties were assigned to Category A. As shown in Table A, the deposits are predominantly of the vein or shear type, although the Yellow Giant property has replacement and disseminated mineralization. The production history of the group is diverse. The Yellow Giant property has never been mined. Each of the other members of Category A have had some production, with the greatest amount coming from Surf Inlet (approximately 1,000,000 tonnes yielding 12,000 kg of gold). Reserve and production data is summarized in Table A.

TABLE A
DEPOSITS OF GOOD POTENTIAL

INV. #	NAME	LOCATION				DEPOSIT TYPE	RESERVES			PRODUCTION HISTORY				CASE STUDY
		LATITUDE °	'	LONGITUDE °	'		TONNAGE (Tonnes)	GRADE (g Au/T)	TYPE/REF.	DATE	TONNAGE (Tonnes)	AMOUNT (kg)	COMMODITY	
10	PANDORA	49	14.8	125	41.2	VEIN/ SHEAR	38,100	15.08 UNCUT	PROBABLE	1940, 1960-64	1,017	4.5 8.4 9 82 36	Au Ag Cu Pb Zn	
							181,437	10.28	POTENTIAL VSE/SMF (1983)					
37	SPUD VALLEY	50	00.8	126	46.7	VEIN	49,895	4.66	REMNANT RESERVES AFTER MINING TO 1942 MRI 80/7	1936, 1938-42, 1951	190,532 (INCLUDES BIG STAR MINE)	1,682.9 560.4 18,000 16,000	Au Ag Cu Pb	1
44	PRIVATEER	50	01.7	126	48.9	VEIN	113,400	8.23	REMNANT RESERVES AFTER MINING (TO 1953?) MRI 80/7	1934-53, 1975(?)	282,328 (INCLUDES PRIDENT MINE)	5,301.3 2,160.2 4,063 10,093	Au Ag Cu Pb	
65	SURF INLET	53	05.0	128	52.8	VEIN/ SHEAR	42,865	13.71	REMNANT RESERVES AFTER MINING TO 1942 HONSBERGER (1973)	1902-43	907,185	11,819.1 6,220.6 2,724,000	Au Ag Cu	2
67	HUNTER	53	12.6	128	22.4	VEIN	94,382	12	INFERRED BY MINE DEVELOPMENT PARRISH (1980)	1933	2.7	933 g 373 g	Au Ag	3
70	YELLOW GIANT	53	21.8	130	07.5				PERS. COMM. (1986)					4
(i)	BOB					VEIN	45,359	40.11	DRILL INDICATED					
(ii)	*DISCOVERY					VEIN	90,719	15.77	DRILL INDICATED					
(iii)	*TEL					VEIN/ REPL	45,350	20.57	DRILL INDICATED					
(iv)	KIM					VEIN & DISS	997,903	2.47	DRILL INDICATED					
	KIM-HIGH GRADE CORE						58,967	11.66						
76	EDYE PASS	54	01.8	130	35.3	VEIN	226,000	8.9	INDICATED BY UNDER- GROUND DRILLING AND SOME DEVELOPMENT DEARIN (1980)	1919-39	61,582	639.9 2,260 4,161	Au Ag Cu	5
85	GEORGIA RIVER GOLD	55	47.3	130	03.0	SHEAR	40,823	15.25 19.54 Ag	INDICATED BY DRILLING AND LIMITED UNDERGROUND WORK PERS. COMM. (1986)	1937	454	10.2 12.8 3,314	Au Ag Pb	

* Note: Reserves are presently being upgraded by 1986 drilling.

In general, the deposits are located within 25 kilometers of tidewater. In some cases, access would have to be upgraded to enable transportation to deposit sites. Details of the location and access are given on the data sheets in Appendix A. The prospects are shown on the index map, Figure I-2, and on location maps in the map section.

The exploration history of the prospects of this group, with the exception of Yellow Giant, which was discovered in the 1960's, began in the early 1900's. In all cases the potential of these prospects has been re-evaluated since the late 1970's after a hiatus in exploration activity. Refer to data sheets for further details.

Case studies which expand on the exploration history of five prospects from Category A are detailed.

2.3.1.1 Case Study 1 - Spud Valley Property (#37)

The Spud Valley property is situated in the Zeballos Mining camp on northwestern Vancouver Island. The town of Zeballos is situated on tidewater at the head of Zeballos Inlet, a branch of Esperanza Inlet. The claims are accessible from the townsite by road, a distance of about 10 km. The claim block is shown on Figure I-Ala.

The property is in a heavily vegetated, rugged mountainous area. Relief on the claim block is more than 300 m.

The climate is mild and wet. Average annual total precipitation at Tahsis climatalogical station, about 11 km southeast of Zeballos, is 3,829 mm and average annual snowfall is 69 cm. At the higher elevations on the claims the precipitation will be greater. Mean daily temperatures at Gold River, 60 km to the southeast, range from 2.6°C in winter to 16.3°C in summer.

The property is underlain by Catface quartz diorite. Sulphide bearing quartz veins and stringers occur in east-northeasterly trending fault zones which dip steeply to the northwest. The veins are displaced by later shears. Splay veins and vein junctions appear to be important in the localization of ore shoots. Figure I-Alb shows the geology at the Zeballos camp.

Five veins are known to exist on the property and a possible sixth was discovered by the 1985 diamond drilling. The known veins are named Goldfield, Roper, Spur, Linton and AT.

The veins consist of quartz and chlorite and abundant sulphides. Pyrite and arsenopyrite are the most common metallic minerals, followed by sphalerite and galena. Visible gold is present. In general, gold content is related to the presence of sphalerite and galena.

Existing reserves are located in remnants and pillars of old stopes.

Recent drilling by McAdam Resources has shown that there is potential for additional reserves in the known veins at depth.

Past production came mostly from the Goldfield Vein. A smaller amount of ore was taken from the Spur Vein, near its intersection with the Goldfield.

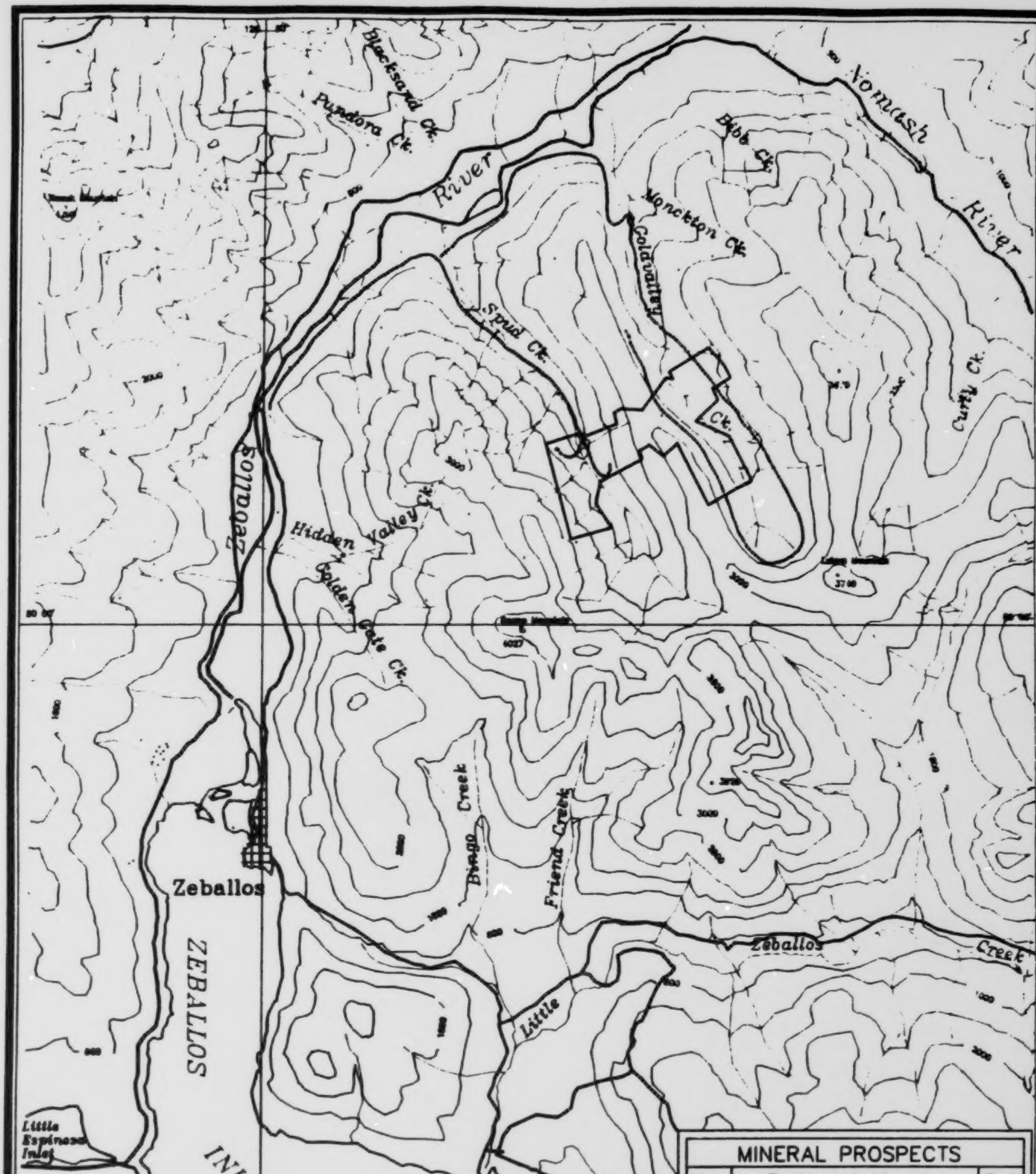
The Goldfield Vein was discovered and staked in 1935. In 1936 three adits were driven. Spud Valley Gold Mines acquired the ground in 1937, continued development of the Goldfield Vein and started underground work on the Spur and Roper Veins.

Regular production began in 1938 and continued until 1942, when labour shortage forced the mine to close. Figure I-A1d is a longitudinal section of the Goldfield Vein showing development to 1942. Stoping was done on the 1-4 levels of the Goldfield Vein in 1939 and on all levels in the Goldfield Vein and the No. 4 level in the Spur Vein during 1940. A total of 6 levels were worked during this time. A seventh was driven in 1946 but no mining was done on it. Some clean-up ore was taken from the workings in 1951.

In 1984 McAdam Resources obtained control of the property. During 1985 the company began a program of rehabilitating the underground workings and completed 3 underground and 6 surface diamond drill holes (see Figure I-A4c). In addition, preliminary metallurgical testing was done on representative samples of ore.

A new vein was intersected by two of the surface drill holes. S-85-6 cut 1 m in grading 83.61 g Au/tonne and S-85-3, 1.1 m of 9.19 g Au/tonne.

Future plans for the property include diamond drilling to test extensions of the new vein and the Linton Vein, as well as test the depth potential of the Goldfield Vein and search for additional structures. Development work on the Linton Vein is planned.


Blacksand Ck.
Pandora Ck.
River
Nomash River
Bibb Ck.
Monckton Ck.
Goldvalley Ck.
Spud Ck.
Curly Ck.
Ck.
Zeballos
Hidden Valley Ck.
Golden Gate Ck.
3000
3710
4027
Bingo Creek
Friend Creek
Zeballos Creek
Little
Zeballos
ZEBALLOS INLET
Little Espinosa Inlet
1000
2000

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
37	Spud Valley	A

NOTES: contour interval 500 feet

Drawn by:
VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 92L 2W/92E 15W

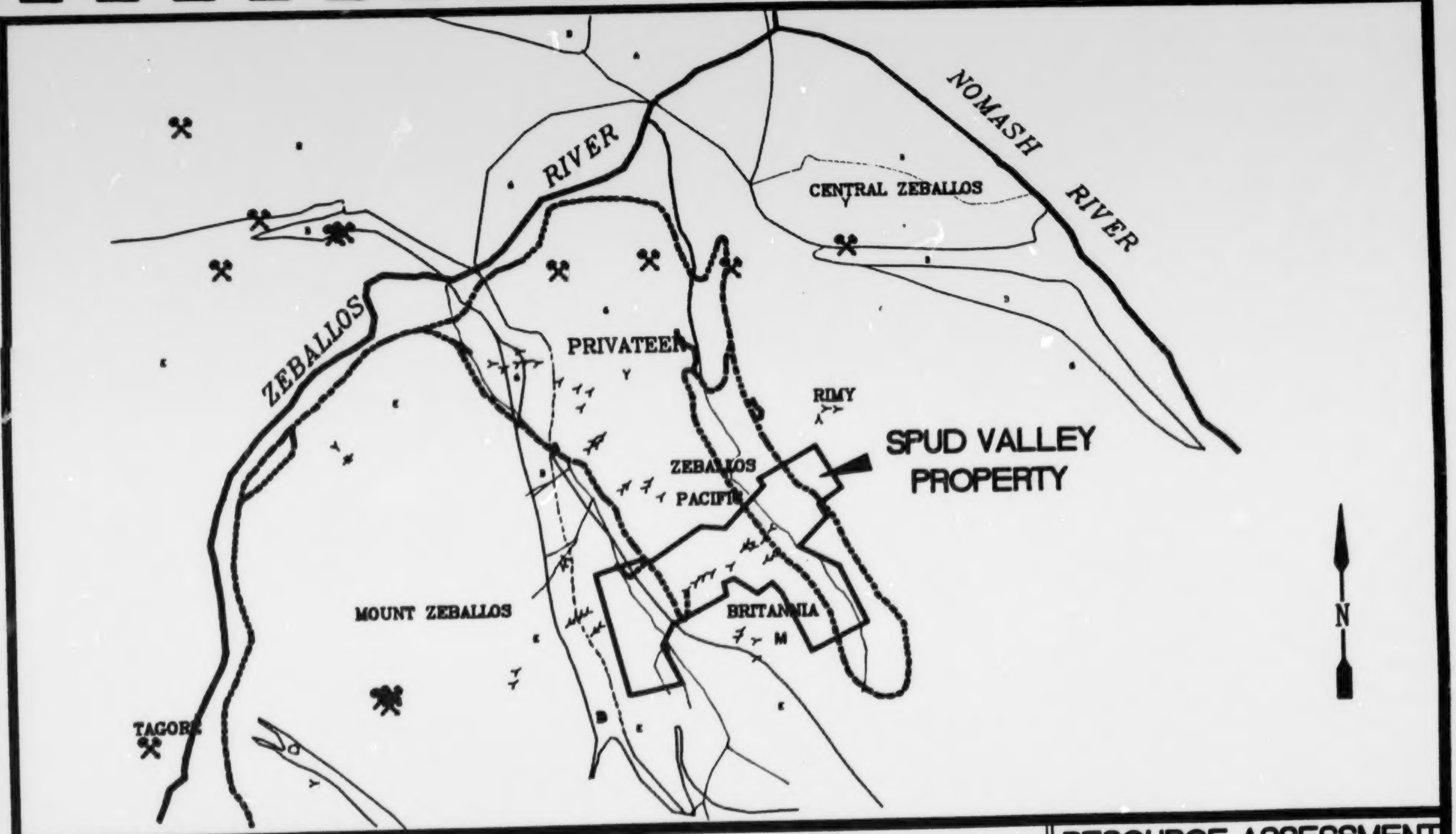
MILES
0 2
0 3
KILOMETRES

RESOURCE ASSESSMENT

SPUD VALLEY PROSPECT
LOCATION MAP

TRM ENGINEERING LTD.

SCALE: 1:50,000
DATE: MARCH 1986
S. GARDINER
FIGURE: I-A1a


NOMASH RIVER
RIVER
ZEBALLOS
CENTRAL ZEBALLOS
PRIVATEER
RIMY
SPUD VALLEY PROPERTY
ZEBALLOS PACIFIC
BRITANNIA
M
MOUNT ZEBALLOS
TAGORE
N
B
D
E

LEGEND

CATFACE INTRUSIONS

- 6 Quartz diorite
- 5 Diorite, volcanics with quartz diorite
- 3 Diorite, granodiorite dykes
- 2 Hornblende diorite
- 1 Gabbro

BONANZA FORMATION

- E Andesite, pyroclastics, crystal tuffs, breccia
- D Lime-silicate rocks Light coloured volcanics
- B Quatsino Limestone
- A Karmutsen Volcanics

- ⚒ Prospect
- ≻ Adit
- Geological contac
- Road
- Creek

NOTES: REFERENCE: ADAPTED FROM MAPS BY STEVENSON (1950) AND SINCLAIR AND HANSEN (1983)

Drawn by: VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 92L 2W/92E 15W

0 1000 3000 FEET

0 250 500 1000 METERS

RESOURCE ASSESSMENT

SPUD VALLEY PROSPECT

REGIONAL GEOLOGY

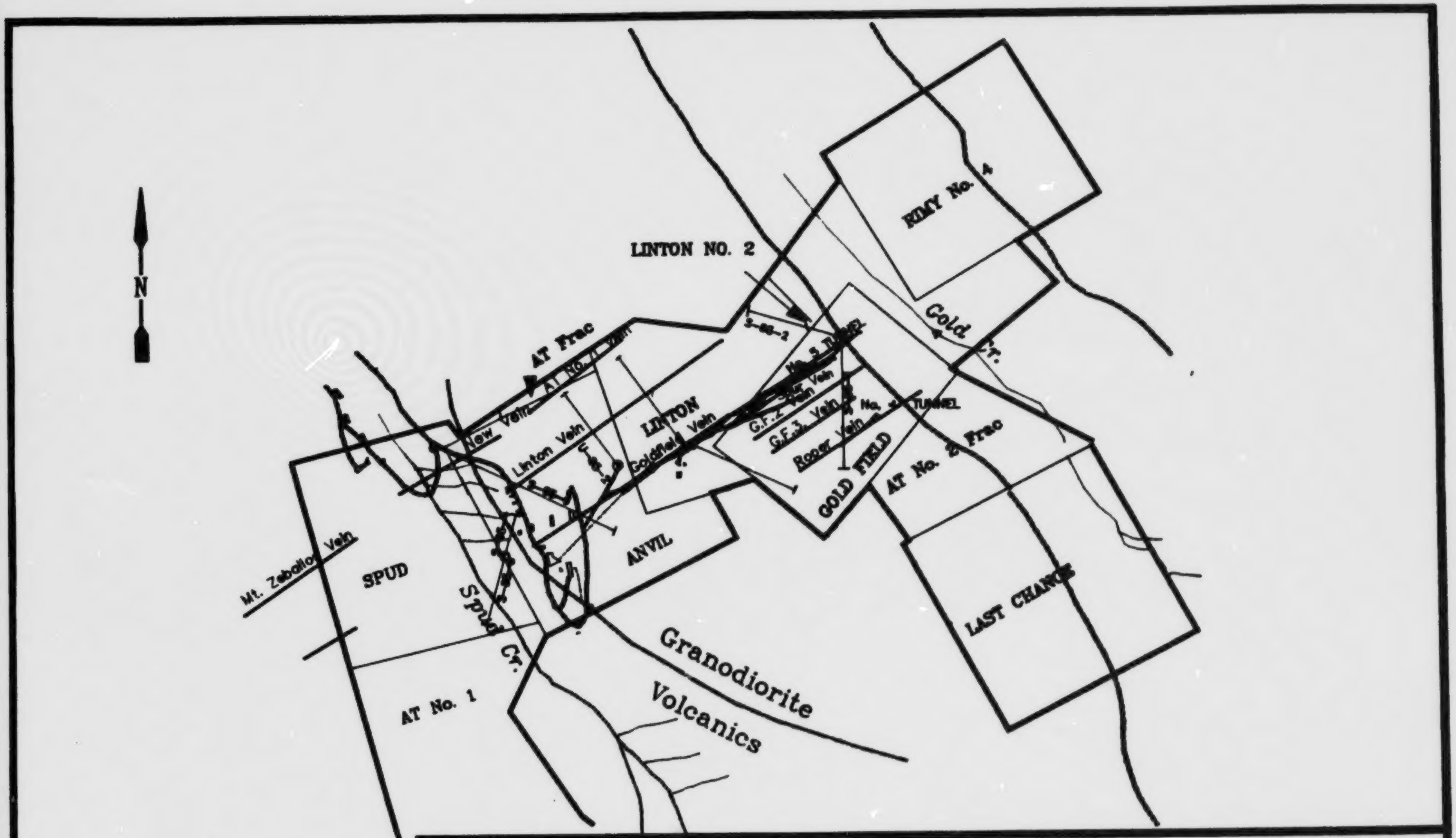
TRM ENGINEERING LTD.

SCALE: 1 : 38400

DATE: MARCH 1986

S. GARDINER

FIGURE: I-A1b


N
LINTON NO. 2
RIMY No. 4
Gold Cr.
AT Frac
AT No. 1 Vein
New Vein
Linton Vein
LINTON
Goldfield Vein
S-88-2
No. 3 TUNNEL
G.F.2 Vein
G.F.3 Vein
No. 4 TUNNEL
Roger Vein
GOLD FIELD
AT No. 2 Frac
LAST CHANCE
ANVIL
SPUD
Mt. Zeballos Vein
Spud Cr.
AT No. 1
Granodiorite
Volcanics

LEGEND

- ADIT
- D.D.HOLE
- S SURFACE HOLE
- U UNDERGROUND HOLE
- VIEN
- CREEK
- ROAD
- CLAIM BOUNDARY
- CONTACT

NOTES:
REFERENCE: ADAPTED FROM REPORTS OF McADAM RESOURCES (1986)

Drawn by:
VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 92L 2W

FEET
METRES

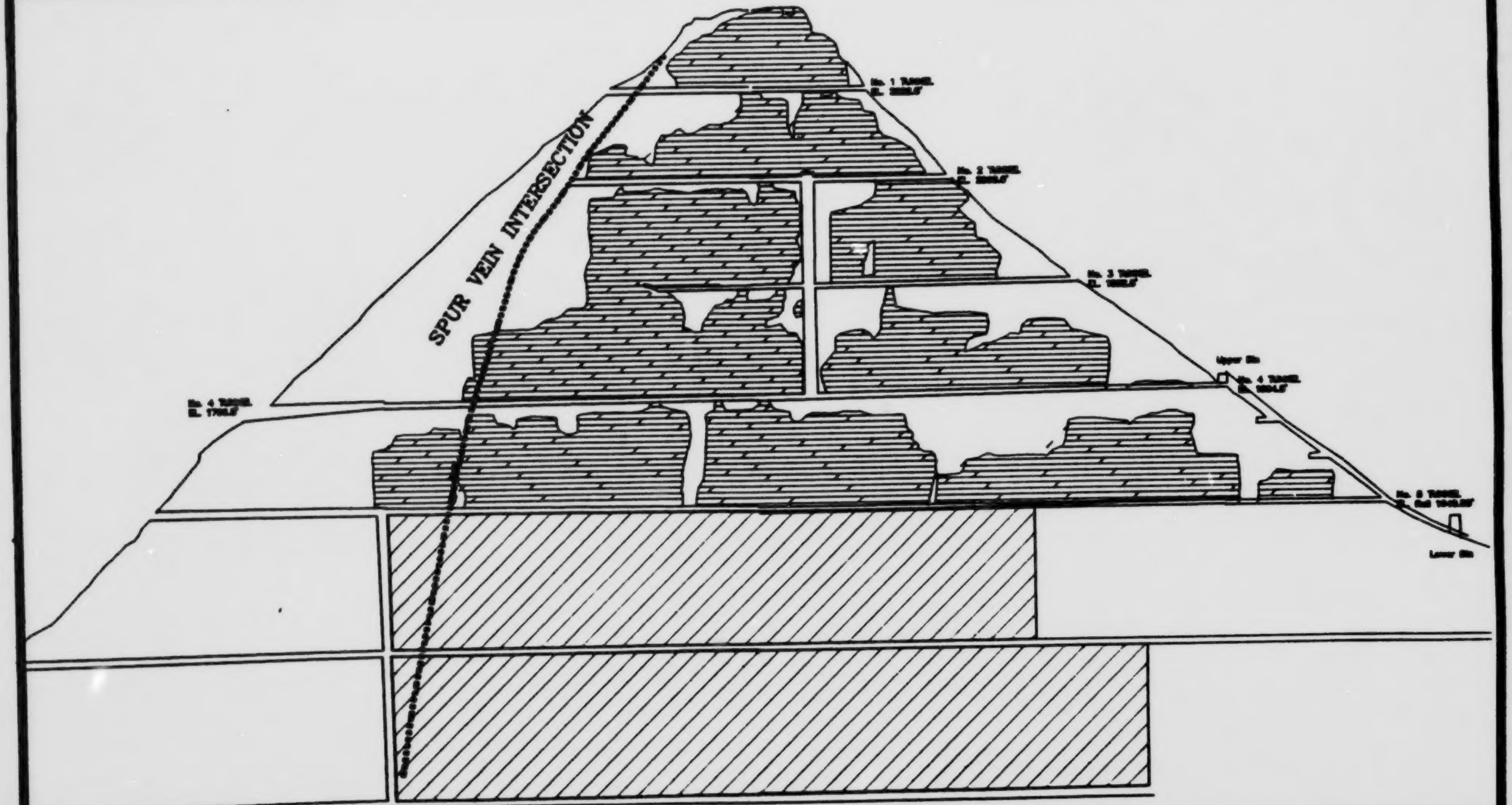
RESOURCE ASSESSMENT

SPUD VALLEY PROPERT

SURFACE PLAN SHOWING VEINS

TRM ENGINEERING LTD.

SCALE: 1:3570	DATE: MARCH 1986
S. GARDINER	FIGURE: I-A1C


SPUR VEIN INTERSECTION
No. 1 TUNNEL
No. 2 TUNNEL
No. 3 TUNNEL
No. 4 TUNNEL
Upper Bin
No. 4 TUNNEL
No. 5 TUNNEL
Lower Bin

LEGEND

▤ SURVEYED STOPE

▨ AREA LIKELY STOPED

NOTES:

REFERENCE: ADAPTED FROM REPORTS OF McADAM RESOURCES (1986)

Drawn by: VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 92L 2W

20 0 40 M

0 160 400 FEET

RESOURCE ASSESSMENT

SPUD VALLEY PROPERTY

LONGITUDINAL SECTION–GOLDFIELD VEIN

TRM ENGINEERING LTD.

SCALE: 1:2400 (approx.)

DATE: MARCH 1986

S. GARDINER

FIGURE: 1–A1D

2.3.1.2 Case Study 2 - Surf Inlet (#65)

The Surf Inlet prospect is situated approximately 12 km from the head of Surf Inlet on Princess Royal Island (see Figure I-Aha). Access is by water to the head of Surf Inlet, about 170 km southeast of Prince Rupert, and by trail to the former mine site. The claims are plotted on Figure I-A2a.

The topography of Princess Royal Island is moderately rugged. The elevation at the main portals is about 50 to 60 m. The claims are cut by Paradise Creek.

Prince Rupert has been used as a station representative of climatic conditions of the property. Average mean daily temperature is 2.7°C in winter and 13.2°C in the summer months. Total annual precipitation is approximately 2,400 mm.

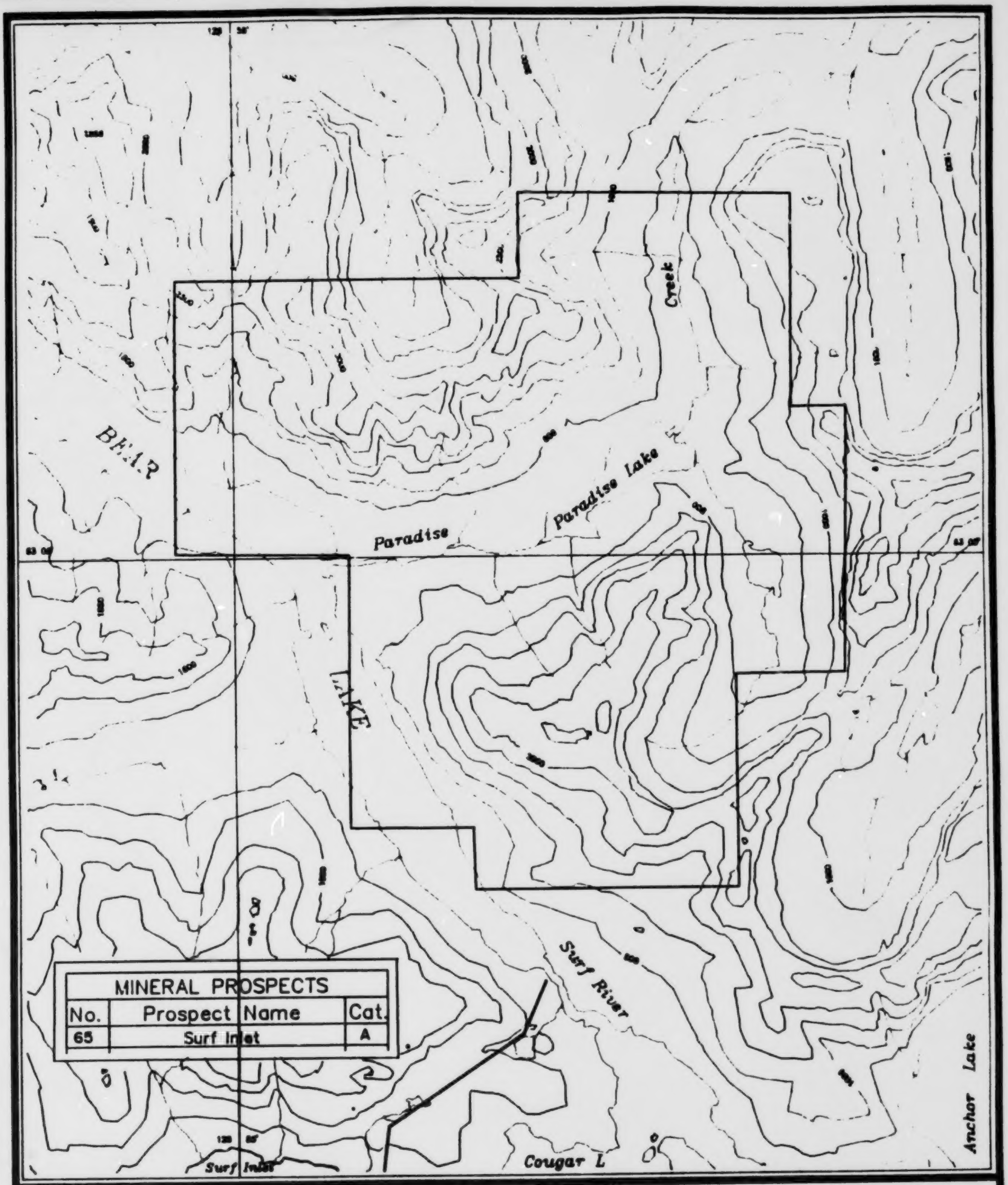
Figure I-A2b is a plan of the surface geology in the vicinity of the Surf Inlet and Pugsley Mines. The property is underlain primarily by diorite and gneiss of the Coast Plutonic Complex. The country rocks are transected by a major northerly trending shear. This structure has been traced for over 4,500 m on surface and to a depth of 900 m.

Quartz veins occur as discontinuous zones within the shear. The veins contain pyrite, chalcopyrite, native gold and molybdenite.

The property was staked in the early 1900's as the D.L.S. group. From 1900-1908 the claims were explored on surface. During the same period trial shipments were made from surface cuts on the veins. The ore had an average grade of 171.4 g Au/tonne and 3% Cu. Underground development began in 1912 by Belmont Surf Inlet Mines. By 1917 over 3,950 m of drifting was completed in two adits. The Surf Inlet Mine was developed north of Paradise Creek and the Pugsley Mine was developed to the south. Full production began in 1917, primarily from the Surf Inlet Mine.

The Mines ceased production in 1926 and in 1933 Princess Royal Mines was incorporated to further develop the property. In 1934 an inclined shaft in the Pugsley Mine was dewatered and development work was carried out on the 1000 level. By 1939 the upper levels of the Surf Inlet Mine were re-evaluated. Development and production, as well as diamond drilling programs, continued until 1942. Figure I-A4c is a longitudinal section of the Mines showing the development to that time. In 1981 Cominco Ltd. and Placer Development Ltd. optioned the property from Matachewan Consolidated Mines and carried out a program of geological mapping, sampling and surface diamond drilling. A total of six holes were drilled (see Figure I-A4b) to test the potential for a large tonnage, low grade deposit. In 1985 Fleet Developments Ltd. optioned the property and initiated a number of engineering studies to evaluate the potential for the renewal of mining at Surf Inlet.

* In 1942 the Mines were closed by a scarcity of labour and general war conditions.


128 30'
53 00'
BEAR
LAKE
Paradise
Paradise Lake
Creek
Surf River
Cougar L
Anchor Lake
Surf Inlet
128 35'
2000
1500
500

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
65	Surf Inlet	A

NOTES: contour interval 500 feet

Drawn by: VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103H 2W

MILES 0 2

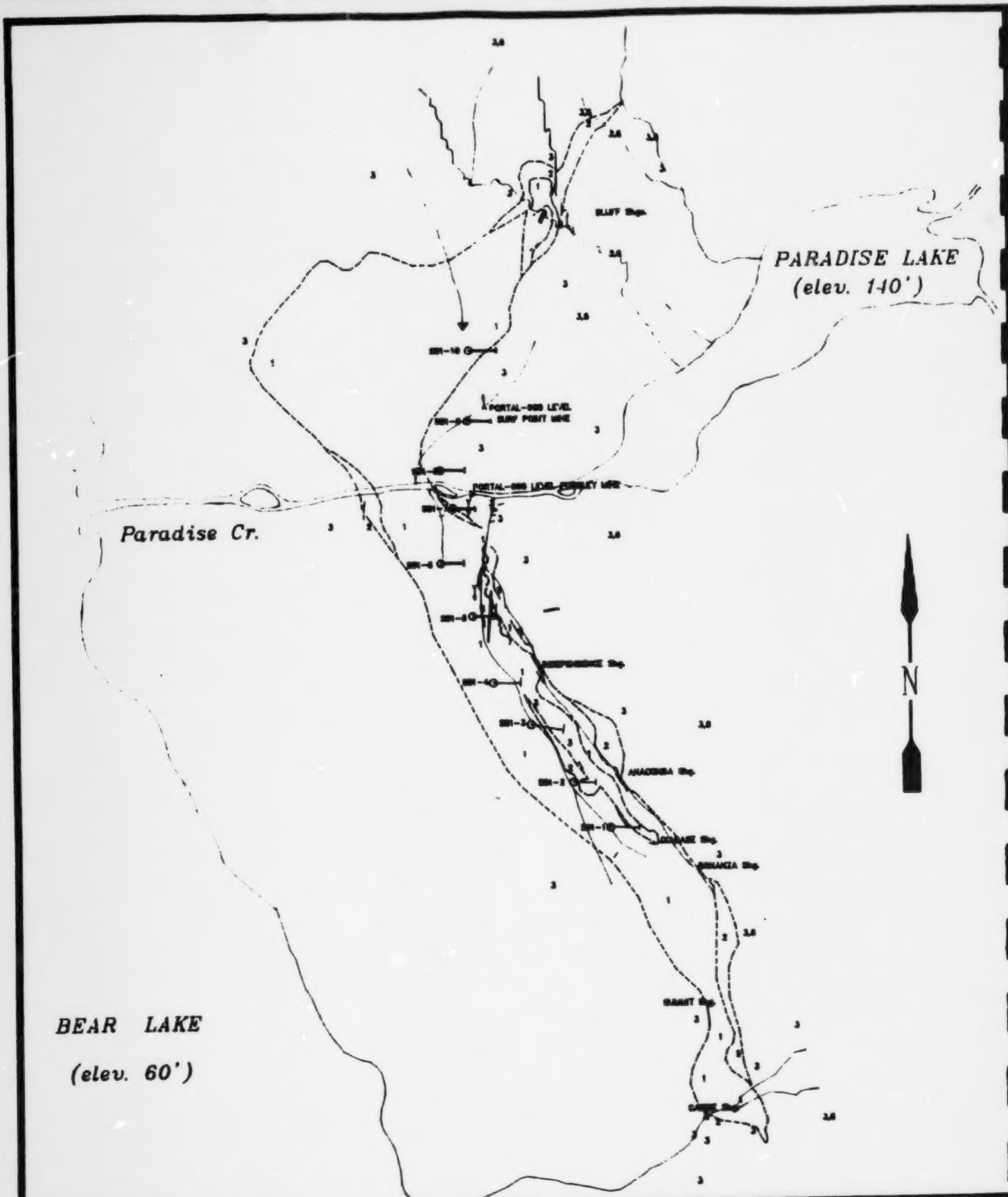
KILOMETRES 0 3

RESOURCE ASSESSMENT

SURF INLET PROSPECT
LOCATION MAP

TRM ENGINEERING LTD.

SCALE: 1:50,000	DATE: MARCH 1986
S. GARDINER	FIGURE: I-A2a


PARADISE LAKE
(elev. 140')
BLUFF Shg.
PORTAL-500 LEVEL
SURF POINT MINE
Paradise Cr.
ANACONDA Shg.
BONANZA Shg.
SUMMIT Shg.
BEAR LAKE
(elev. 60')
N

LEGEND

- GEOLOGICAL CONTACT
- FAULT
- STREAM/LAKE
- DIAMOND DRILLHOLE
- ADIT
- 4 PEGMATITE
- QUARTZ VEINS
- 3 DIORITE
- 2 DIORITE-GNEISS CONTACT ZONE
- 1 GNEISS

NOTES:

REFERENCE: ADAPTED FROM REPORT BY COMINCO LTD., 1981

Drawn by:
VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103H 2W

0 500 1000 FEET

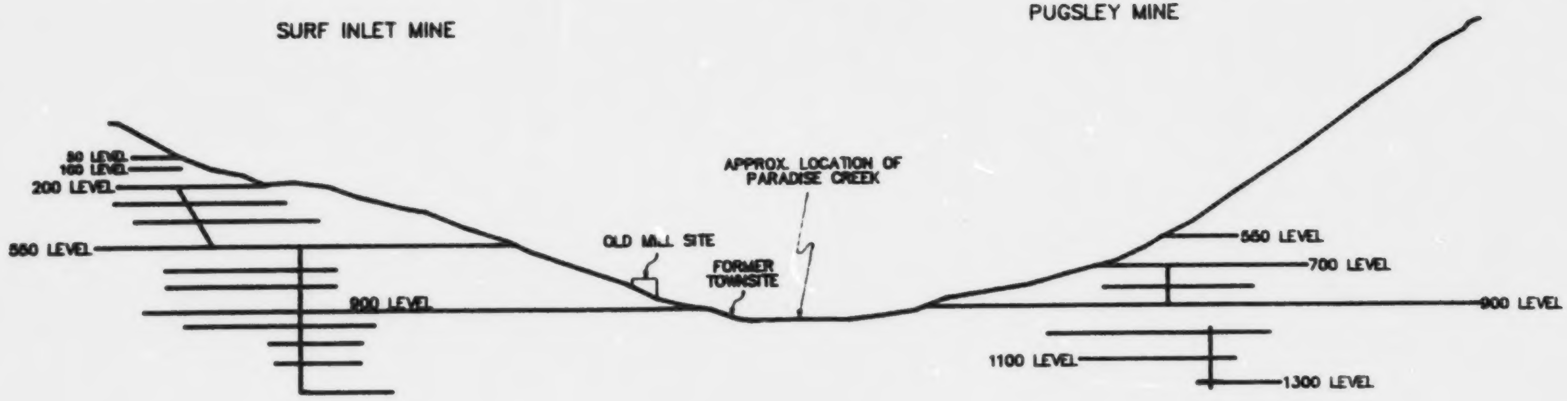
0 100 200 300 400 500 METRES

RESOURCE ASSESSMENT

SURF INLET PROSPECT
GEOLOGY AND SURFACE PLAN

TRM ENGINEERING LTD.

SCALE: 1:21830	DATE: MARCH 1986
S. GARDINER	FIGURE: I-A2b


SURF INLET MINE
PUGSLEY MINE
80 LEVEL
100 LEVEL
200 LEVEL
550 LEVEL
900 LEVEL
OLD MILL SITE
FORMER TOWNSITE
APPROX. LOCATION OF PARADISE CREEK
550 LEVEL
700 LEVEL
900 LEVEL
1100 LEVEL
1300 LEVEL

NOTES:
REFERENCE: ADAPTED FROM COMPANY REPORTS OF FLEET DEVELOPMENTS LTD.

Drawn by:
VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103H 2W

0 60 120 180 240 METERS
0 500 1000 FEET

RESOURCE ASSESSMENT

SURF INLET PROSPECT
LONGITUDINAL SECTION

TRM ENGINEERING LTD.

SCALE: 1:12,308	DATE: MARCH 1986
S. GARDINER	FIGURE: 1-A2c

2.3.1.3 Case Study 3 - Hunter Property (#67)

The Hunter prospect is located in the Coast Mountain Range of British Columbia, about 100 km south of Kitimat. Access is by trail along the north branch of the Khutze River, a distance of 22 km from tidewater at the head of Khutze Inlet. Khutze Inlet branches from Princess Royal Channel, which separates Princess Royal Island from the mainland (see Figure I-A3a).

The property straddles the steep sided Khutze River Valley. The area is rugged and elevations range from 270 m in the valley to 1,500 m on adjacent mountains. Below treeline the ground is covered by typical west coast rain forest. At higher elevations bare rock exposures are common and vegetation consists of scrub trees and alpine meadow.

The climate is cool and wet. Total average annual precipitation at the climatic gauging station at Bella Coola, about 130 km to the southeast, is 1,530 mm and the average snowfall is 173 cm. Mean daily temperatures range from 0.7°C in winter to 15.0°C in summer. Since the Hunter prospect is closer to the coast and less protected than Bella Coola, precipitation at the claims is likely higher and temperatures slightly cooler.

The property is underlain by a roof pendant composed of biotite granitoid gneiss in granitic rocks of the Coast Crystalline Complex. The gneiss has been intruded by numerous felsite, aplite and pegmatite dikes of quartz diorite to quartz-monzonite composition. A number of north to northeasterly trending sulphide bearing quartz veins cut the gneiss. In some cases the veins are enclosed in pegmatite dikes (see Figure I-A3b).

Six veins are known to exist on the property: No. 4, Burnt Tree, Main, River, Cross and No. 2. Of these only the River and Main Veins have underground development. Quoted reserves are derived from these six veins (see Figures I-A3c to e).

The predominant composition of the veins is white quartz and sulphides. Pyrite is the most common metallic mineral and constitutes about 10-20% of the vein material. Chalcopyrite, native gold and gold tellurides are present in small amounts. Gold content is related to the presence and abundance of pyrite.

The prospect was discovered and staked in 1927. In 1929 and 1930 trail and cable car access was constructed from Khutze Inlet.

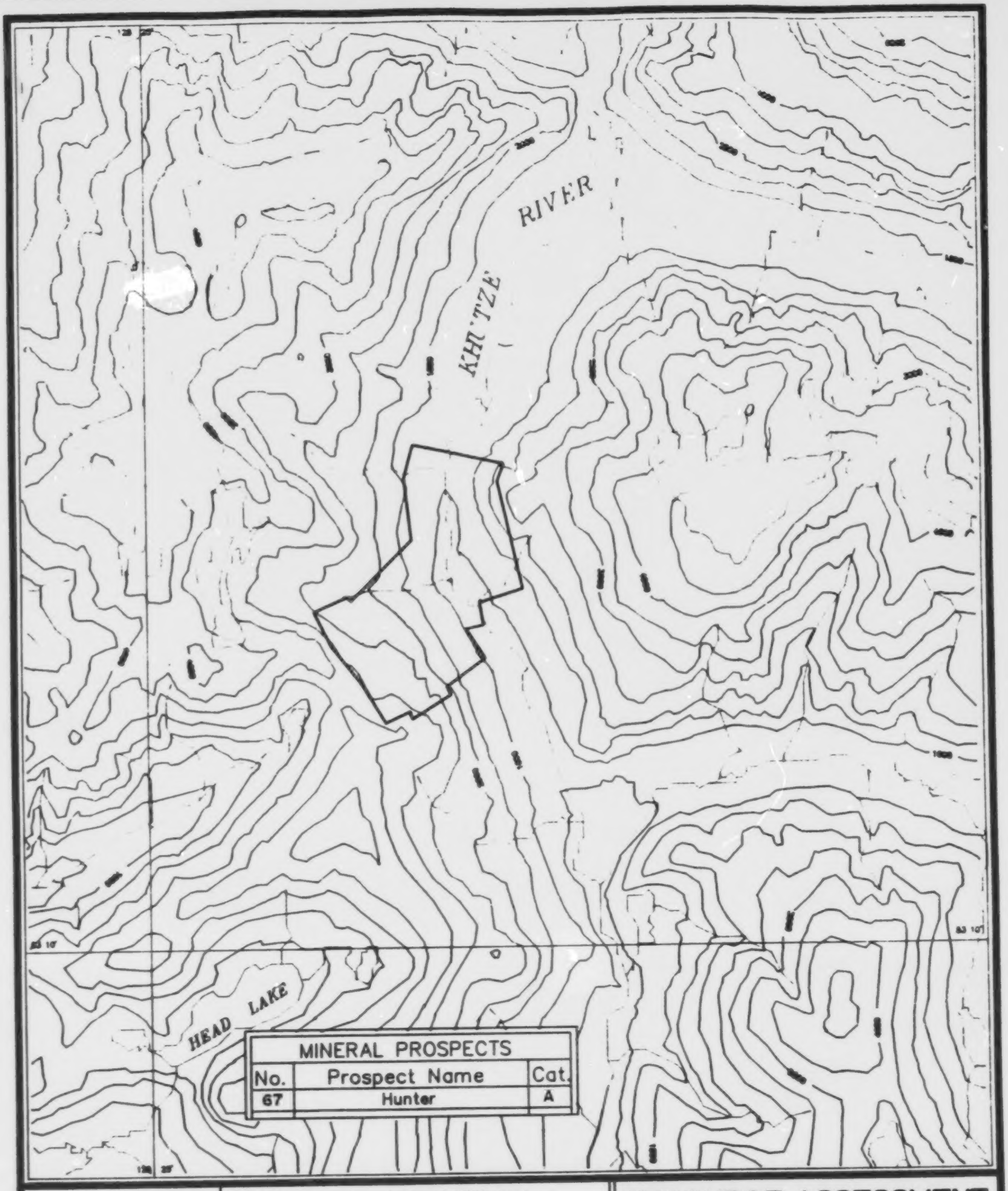
From 1932 to 1936 little work was done on the claims, however, it was during this period that the only production from the property took place. In 1933, 2.7 tonnes were shipped from surface pits on the River Vein and yielded 933 g Au and 373 g Ag.

In 1937 Sheep Creek Mines drove a tunnel 42 m in length on the Main Vein. The property was re-optioned in 1940 and a 46 m shaft was sunk and two 15.2 m drifts were driven from the shaft on the River Vein. The claims were surveyed and crown granted in 1948.

In 1980 the River Vein workings were dewatered and rehabilitated and the drifts sampled and mapped. In addition, surface trenches on the Vein were cleaned out, mapped and sampled.

In 1983 the property was optioned by Arnhem Resources and geological and geochemical surveys were carried out as well as geological mapping and sampling of trenches and underground workings. During 1984 the River Vein was tested by 731 m of diamond drilling in 7 holes. The structure was found to splay at depth.

Two diamond drill holes intersected the No. 2 Vein and encountered narrow zones of mineralization.


KHUTZE RIVER
HEAD LAKE
128 25'
53 10'
53 10'
128 25'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
67	Hunter	A

NOTES: contour interval 500 feet

Drawn by:
VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103 H 1W

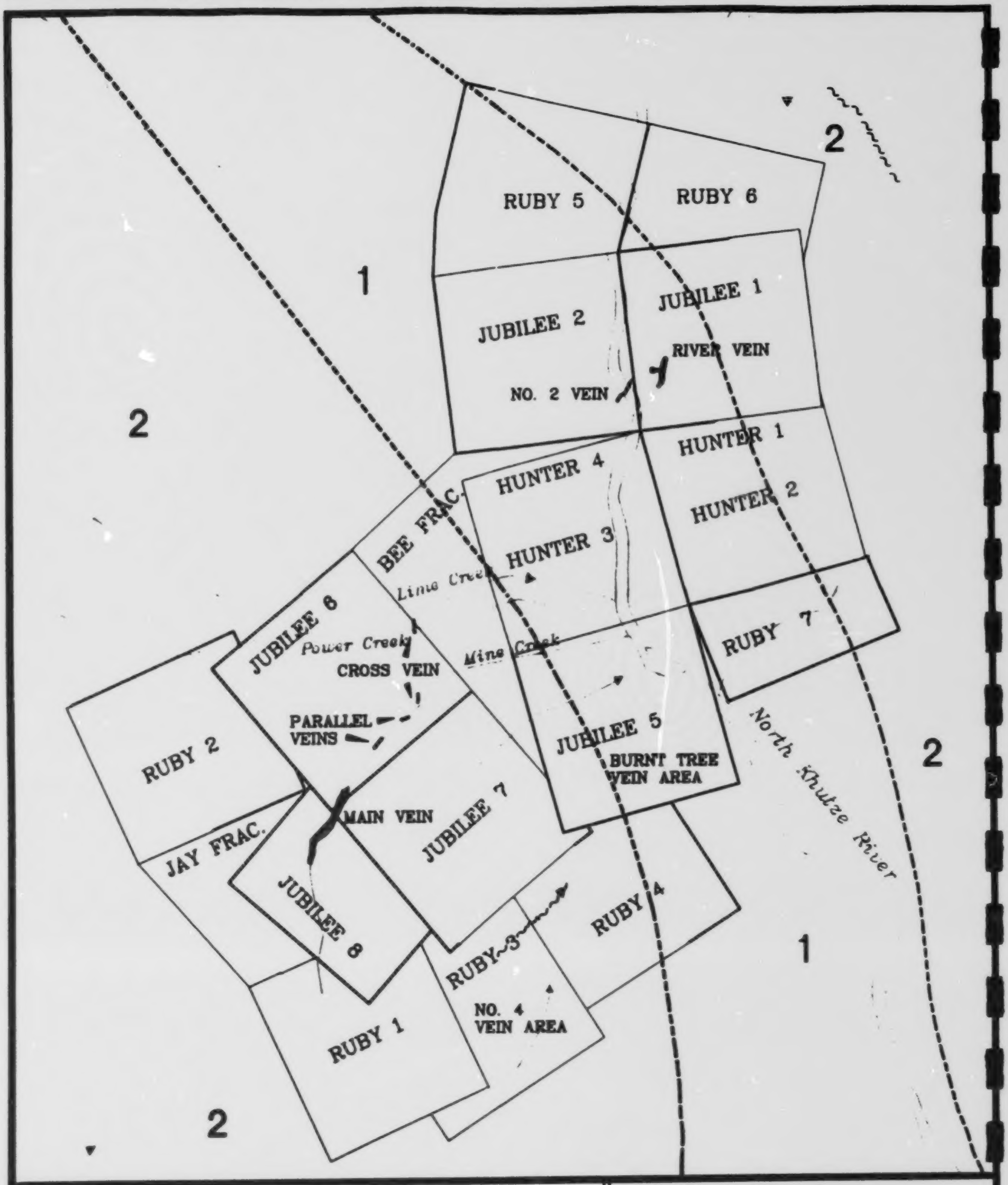
0 MILES 2
0 KILOMETRES 3

RESOURCE ASSESSMENT

HUNTER MINERAL PROSPECT LOCATION MAP

TRM ENGINEERING LTD.

SCALE: 1:50,000	DATE: MARCH 1986
S. GARDINER	FIGURE: I-A3a


2
RUBY 5
RUBY 6
1
JUBILEE 2
JUBILEE 1
RIVER VEIN
NO. 2 VEIN
2
HUNTER 1
HUNTER 4
HUNTER 2
BEE FRAC.
HUNTER 3
Lime Creek
JUBILEE 6
Power Creek
Mine Creek
RUBY 7
CROSS VEIN
PARALLEL VEINS
RUBY 2
JUBILEE 5
BURNT TREE VEIN AREA
North Khutze River
2
MAIN VEIN
JUBILEE 7
JAY FRAC.
JUBILEE 8
RUBY 4
RUBY 3
1
RUBY 1
NO. 4 VEIN AREA
2

LEGEND

Mineralized Vein
Granitic Gneiss
Metavolcanics; Biotite Gneiss
Creek
Fault
Claim Boundary
Underground working
Shaft

NOTES: Reference: Adapted from Report by T.C. Scott (1984)

Drawn by: VISTA GEO-GRAPHICS, Vancouver, B.C.

N.T.S. 103 H 1W

0 100 200 300 400 500
METRES
0 400 800
FEET

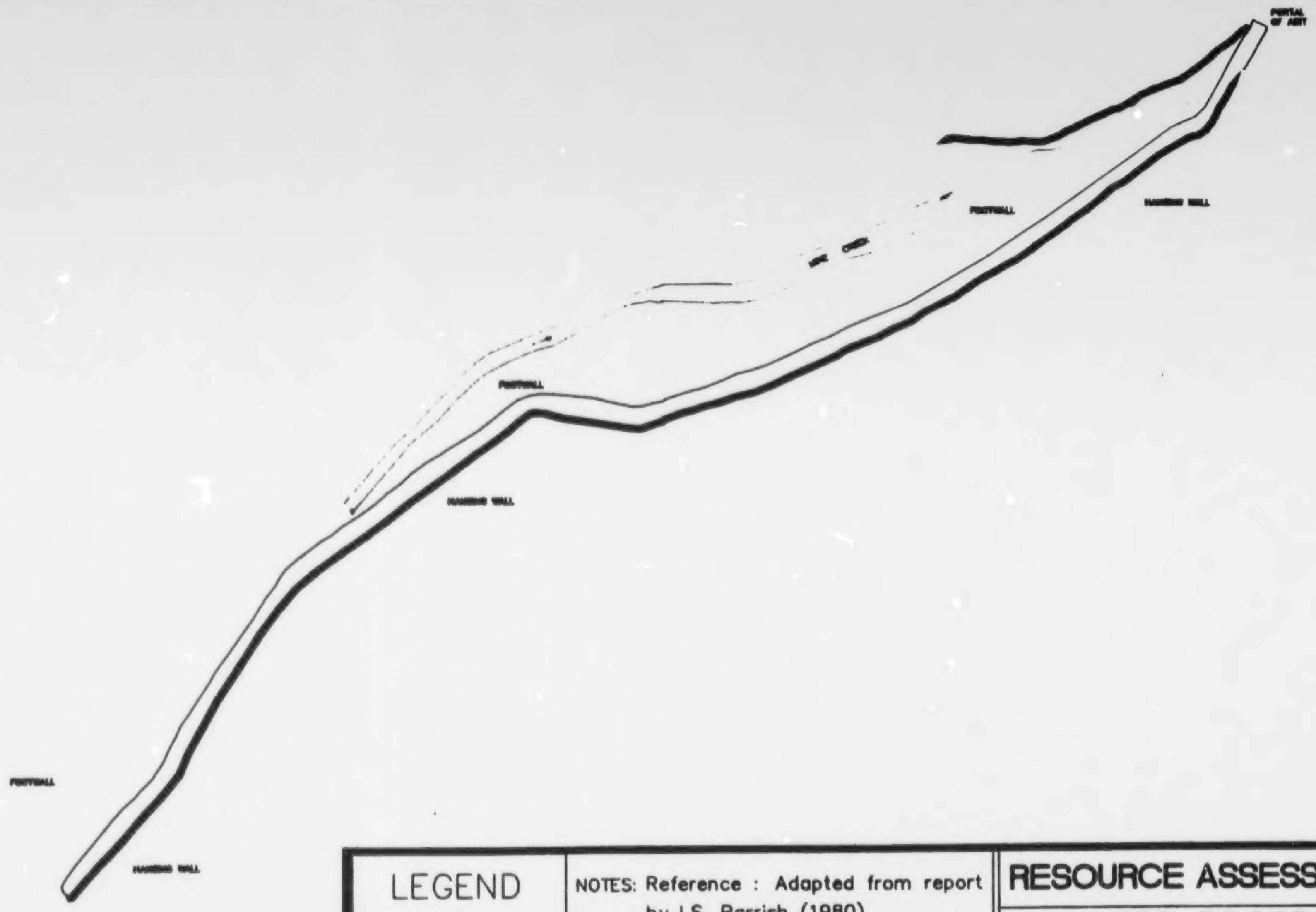
RESOURCE ASSESSMENT

HUNTER PROSPECT

PLAN OF GEOLOGY, CLAIMS AND WORKINGS

TRM ENGINEERING LTD.

SCALE: 1:13,100	DATE: MARCH 1986
S. GARDINER	FIGURE: I-A30


PORTAL OF ADIT
HANGING WALL
FOOTWALL
FOOTWALL
HANGING WALL
FOOTWALL
HANGING WALL

LEGEND

═ ADIT SHAFT

▬ VEIN

NOTES: Reference : Adapted from report by I.S. Parrish (1980)

Drawn by: VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103H 1W

20 0 20 FEET

5 0 10 METERS

RESOURCE ASSESSMENT

HUNTER PROSPECT

PLAN OF WORKINGS ON MAIN VEIN

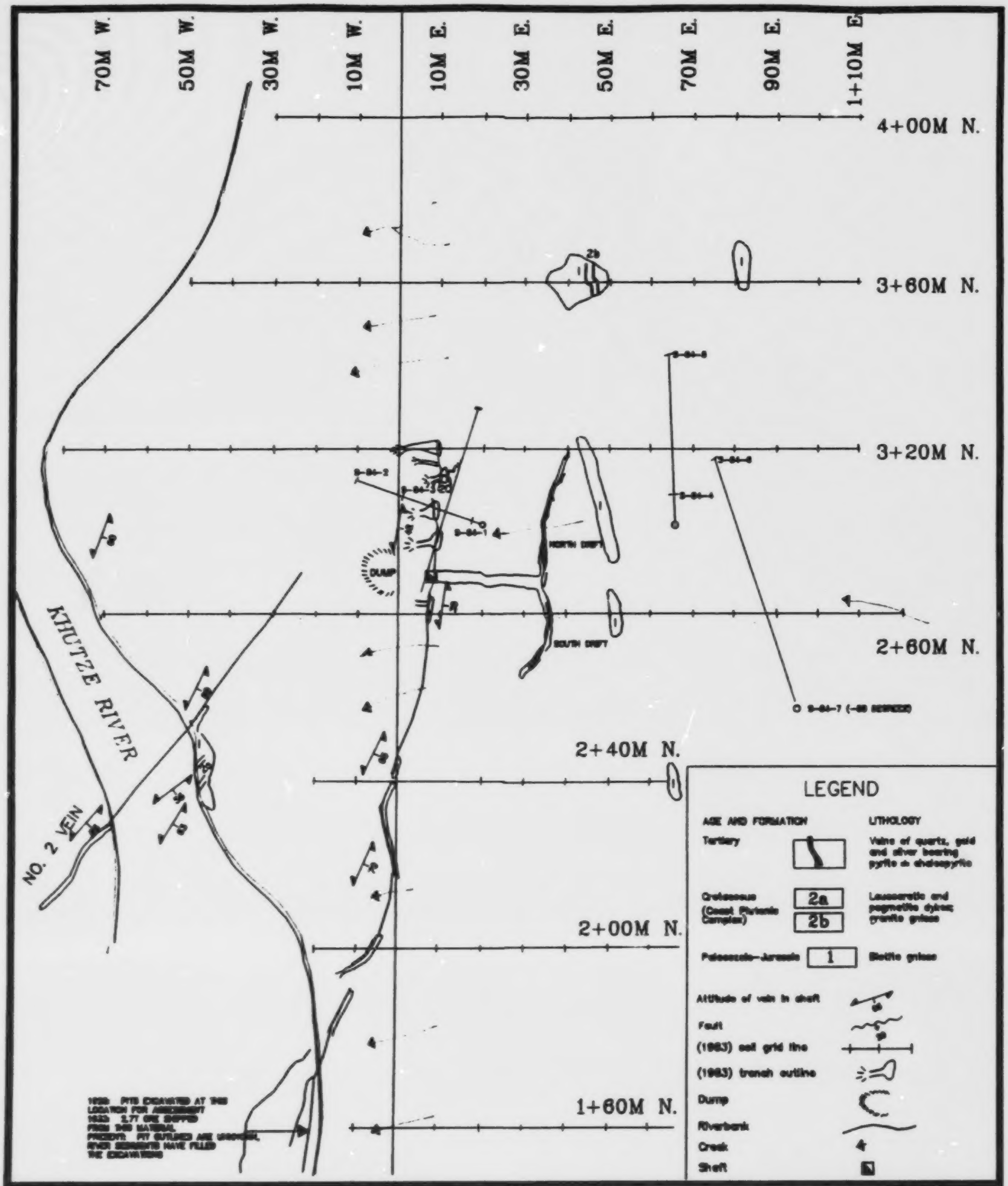
TRM ENGINEERING LTD.

SCALE: 1:238

DATE: MARCH 1986

S. GARDINER

FIGURE: I–A3C


70M W.
50M W.
30M W.
10M W.
10M E.
30M E.
50M E.
70M E.
90M E.
1+10M E
4+00M N.
3+60M N.
3+20M N.
2+60M N.
2+40M N.
2+00M N.
1+60M N.
KHUTZE RIVER
NO. 2 VEIN
2b
1
S-84-2
S-84-3
S-84-1
S-84-5
S-84-4
S-84-6
S-84-7 (-60 DEGREES)
NORTH DRIFT
SOUTH DRIFT
DUMP
1929: PITS EXCAVATED AT THIS LOCATION FOR ASSESSMENT
1933: 2.77 ORE SHIPPED FROM THIS MATERIAL
PRESENT: PIT OUTLINES ARE UNKNOWN, RIVER SEDIMENTS HAVE FILLED THE EXCAVATIONS
LEGEND
AGE AND FORMATION
LITHOLOGY
Tertiary
Veins of quartz, gold and silver bearing pyrite ± chalcopyrite
Cretaceous (Coast Plutonic Complex)
2a
2b
Leucocratic and pegmatitic dykes; granite gneiss
Paleozoic-Jurassic
1
Biotite gneiss
Attitude of vein in shaft
Fault
(1983) soil grid line
(1983) trench outline
Dump
Riverbank
Creek
Shaft

NOTES:
Reference: adapted from report by T. C. Scott (1984)

Drawn by: VISTA GEO-GRAPHICS, Vancouver, B.C.

N.T.S. 103H 1W

0 10 20 30 40 50 meters

50 25 0 50 100 feet

RESOURCE ASSESSMENT

HUNTER PROSPECT

COMPILATION PLAN - RIVER VEIN AREA

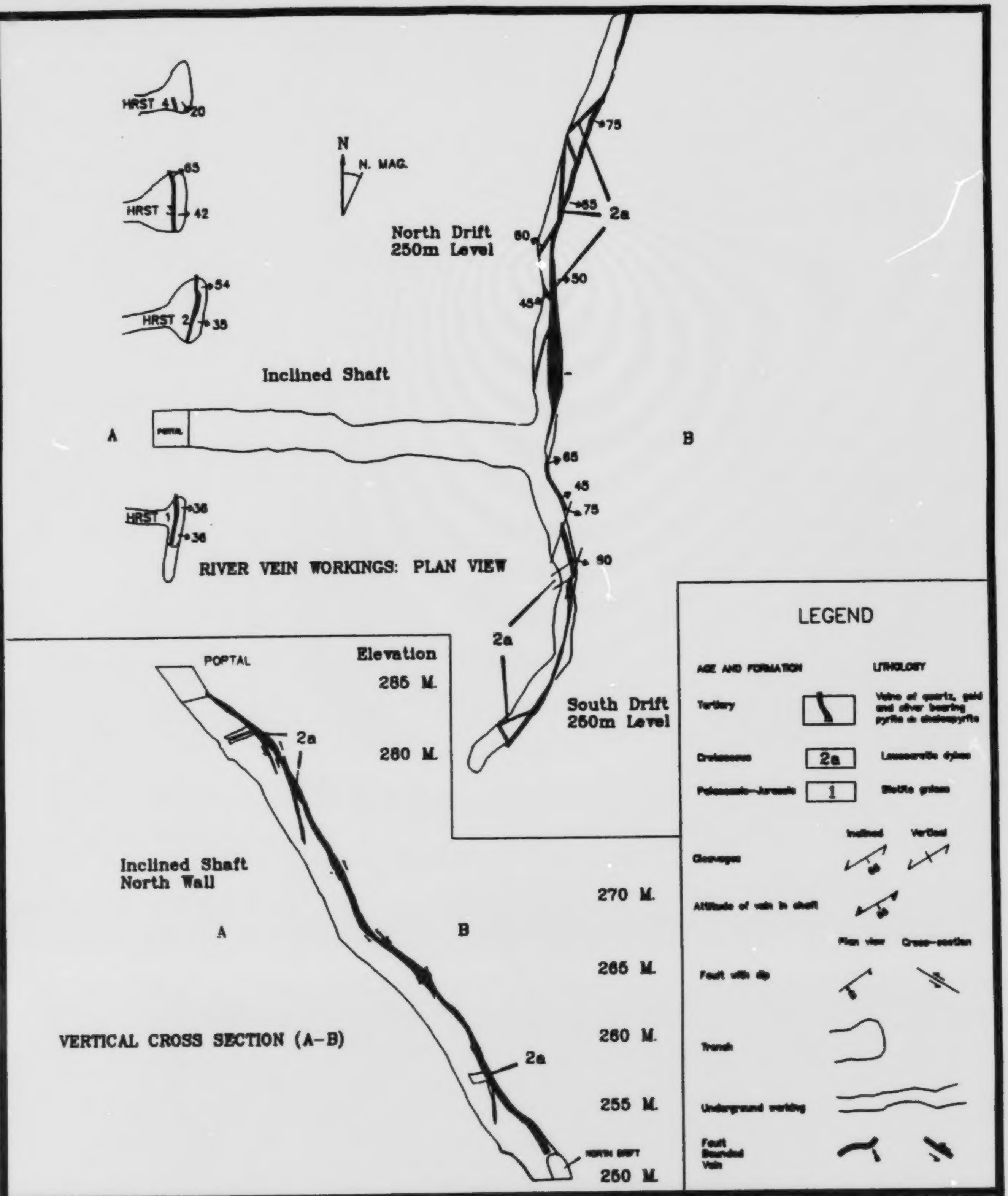
TRM ENGINEERING LTD.

SCALE: 1:1000

DATE: MARCH 1986

S. GARDINER

FIGURE: I-A3D


HRST 4
20
N
N. MAG.
HRST 3
65
42
North Drift
250m Level
60
75
65
2a
50
45
HRST 2
54
35
Inclined Shaft
A
PORTAL
B
65
45
75
HRST 1
36
36
60
RIVER VEIN WORKINGS: PLAN VIEW
2a
Elevation
POPTAL
285 M.
280 M.
2a
South Drift
250m Level
Inclined Shaft
North Wall
A
B
270 M.
265 M.
260 M.
255 M.
250 M.
2a
VERTICAL CROSS SECTION (A–B)
NORTH DRIFT
LEGEND
AGE AND FORMATION
LITHOLOGY
Tertiary
Veins of quartz, gold and silver bearing pyrite & chalcopyrite
Cretaceous
2a
Lamprophyre dykes
Paleozoic–Jurassic
1
Biotite gneiss
Inclined
Vertical
Cleavages
Attitude of vein in shaft
Plan view
Cross-section
Fault with dip
Trench
Underground working
Fault Bounded Vein

NOTES:

REFERENCE: ADAPTED FROM REPORT BY T.C. SCOTT (1984)

Drawn by:
VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103H 1W

0 5 10 20 METERS

10 5 0 10 20 30 40 50 60 FEET

RESOURCE ASSESSMENT

HUNTER PROSPECT

PLAN OF WORKINGS ON RIVER VEIN

TRM ENGINEERING LTD.

SCALE: 1:400 (approx.)

DATE: MARCH 1986

S. GARDINER

FIGURE: I-A3E

In 1985 Arnhem Resources Ltd. returned the property to the original owner.

2.3.1.4 Case Study 4 - Yellow Giant (#70)

The Yellow Giant property is located on Banks Island which is situated about 120 km southwesterly of Prince Rupert. Access to the claims is by water to Survey Bay on the western coast of Banks Island. The property location is shown in Figure I-4a.

The topography of Banks Island is moderate, consisting of rounded hills and low lying, poorly drained areas. Elevation on the property ranges from 0-30 m.

The climate is cool and wet, similar to that of Prince Rupert. The climatic station at Prince Rupert records the average mean daily temperature as 2.7°C in the months January to March and 13.2°C during the summer months of July, August and September. Total average annual precipitation is in excess of 2,400 mm, 37% of which falls during the fourth quarter. Annual snowfall is 113.2 m.

The Yellow Giant property is underlain primarily by granite, quartz, monzonite, quartz diorite and diorite of the Coast Plutonic Complex. Northwesterly trending belts of Alexander Terrane metasedimentary rocks which include limestone, argillite and quartzite are present. The metasedimentary sequence has been invaded by the Coast Intrusions and well developed local and regional fault and fracture systems transect all lithologies.

The Yellow Giant property contains four main deposits: the Bob, Tel, Discovery and Kim, as well as numerous other showings (see Figure I-A4a). The mineralization may be, in part, disseminated, such as at the Kim Zone; or localized in veins, replacements and silicified lodes, such as at the Bob, Tel and Discovery Zones. Mineralization consists of pyrite, pyrrhotite, arsenopyrite, chalcopyrite, sphalerite, galena and molybdenite. Gold and silver is associated with the sulphides.

The original discovery on Banks Island, the Discovery Zone, was made in 1960 by Ventures Ltd. during a reconnaissance survey along the coast of British Columbia. The survey had been initiated to prospect prominent structural trends or lineaments transecting the coastal rock units. The concept was correct, for the mineral deposits on Banks Island are in large plart controlled by structure. The main lineaments on the Yellow Giant property are shown on the geology plan, Figure I-A4b.

Most of the early exploration work was carried out by Falconbridge Ltd. and McIntyre Porcupine Mines. Sproatt Silver Mines acquired the Tel deposit in 1975 and acquired the remainder of the property in 1977. Trader Resource Corp. optioned the property in 1983 and to date has earned an 80% interest.

Figure I-A4d is a compilation of exploratory work completed by the various companies. Figures I-A4e to h are geology and drill location maps for the Bob, Discovery, Tel and Kim Zones. The exploration history of the four deposits is outlined in the following sections.

(i) Bob Zone

The Bob Zone was discovered by Falconbridge in 1963, and the next year a self-potential geophysical survey, geological mapping and a geochemical survey were carried out. Three packsack drill holes were completed and several mineralized intersections were encountered. No further work was done until 1974 at which time a geochemical survey outlined mercury, arsenic, zinc and silver anomalies within the area. In 1976 a diamond drill program consisting of four holes located 2 high grade intersections in an area west of previously known mineralization. In June 1977 Sproatt Silver Mines Ltd. began exploratory development of the deposit by means of a decline. By February 1978 this decline had advanced to a second level along which the mineralization was followed for a dinstance of 85.3 m. An ore shoot 44 m in length and 1.7 m in width was exposed with an average grade of 34.28 g Au/T and 107.3 g Ag/T. A program of underground diamond drilling totalling 341.5 m in 7 holes was also completed at this time. Since 1983, Trader Resource Corp. has undertaken geological mapping, geochemical sampling, trenching and airborne geophysical surveys over the Bob Zone. The underground workings have been dewatered, mapped and surveyed. The deposit has been tested by additional diamond drillling in 1984 and 1985.

(ii) Discovery Zone

The Discovery Zone was located and prospected in 1960. In the same year the zone was tested by 11 packsack drill holes. In 1963, Falconbridge Mines Ltd. staked additional claims and carried out geophysical and geochemical surveys and a 14 hole diamond drilling program on the Discovery Zone. Based on the results of the 1960 and 1963 drilling, a reserve estimate of approximately 57,000 tonnes with an average grade of 18.51 g Au/tonne was made by Falconbridge Mines Ltd. No further work was done on the Discovery Deposit until 1975 when grid surveys by Falconbridge covered this area. In 1984 Trader Resource Corp. carried out ground I.P. and airborne Dighem surveys over the deposit. During 1984 and 1985 limited diamond drilling was carried out.

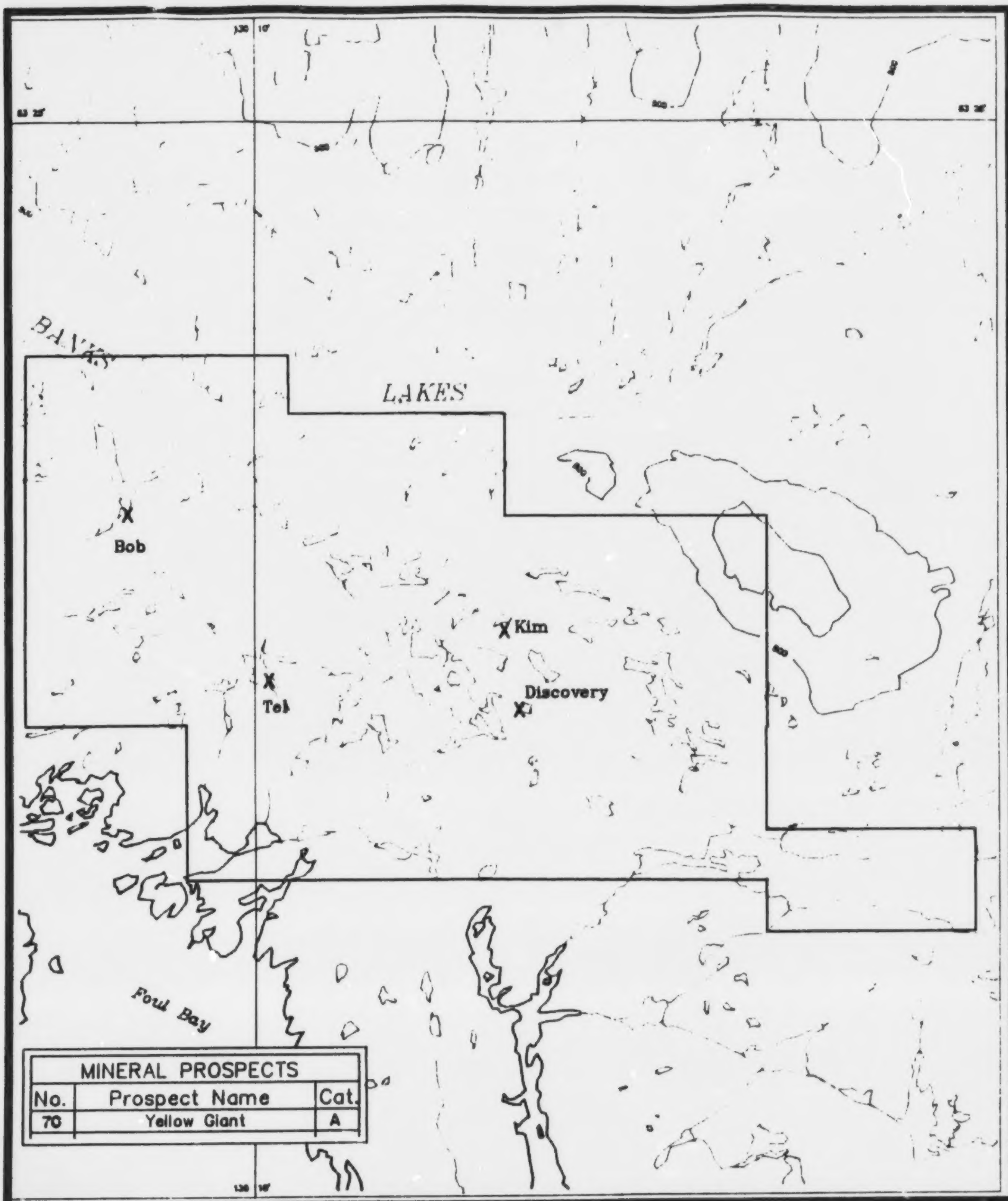
(iii) Tel Zone

The Tel Zone was discovered in 1963 by McIntyre Porcupine Mines Ltd. During that year geological mapping and self-potential surveys over the zone were completed. In 1964, McIntyre Porcupine Mines Ltd. traced the zone for 300 m by test pits and by 26 shallow packsack drill holes totalling 536.8 m. Later in 1975, Sproatt Silver Mines Ltd. carried out a 9 hole diamond drilling program totalling 998.2 m and an I.P. geophysical survey. Reconnaissance and detailed geochemical surveys were carried out by Trader Resource Corp. since 1981 and a diamond drilling program of 30,317 feet in 50 holes was completed in early 1986. Total drilling on the Tel Zone is 33,617 feet in 65 holes.

(iv) Kim Zone

The Kim Zone was discovered and staked by Falconbridge in 1963. By 1975, geophysical surveys, geological mapping, trenching and 3,476 m of diamond drilling in 63 holes were carried out over the Zone with the majority of the work done during the 1963-1964 field seasons. A low grade large tonnage deposit was outlined and in 1983 International Geosystems estimated a reserve of approximately 1,000,000 tonnes at an average grade of 2.47 g Au/T.

Trader Resource Corp. carried out geological mapping, trenching and surface diamond drilling programs in 1984 and 1985. The drilling results indicate that the deposit has a high grade core consisting of 58,967 tonnes at a grade of 11.67 g Au/T.


130 10'
53 25'
53 25'
BANKS
LAKES
Bob
Kim
Tel
Discovery
Foul Bay
130 10'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
70	Yellow Giant	A

NOTES: contour interval 500 feet

Vancouver, B.C.

N.T.S. 103G 8E

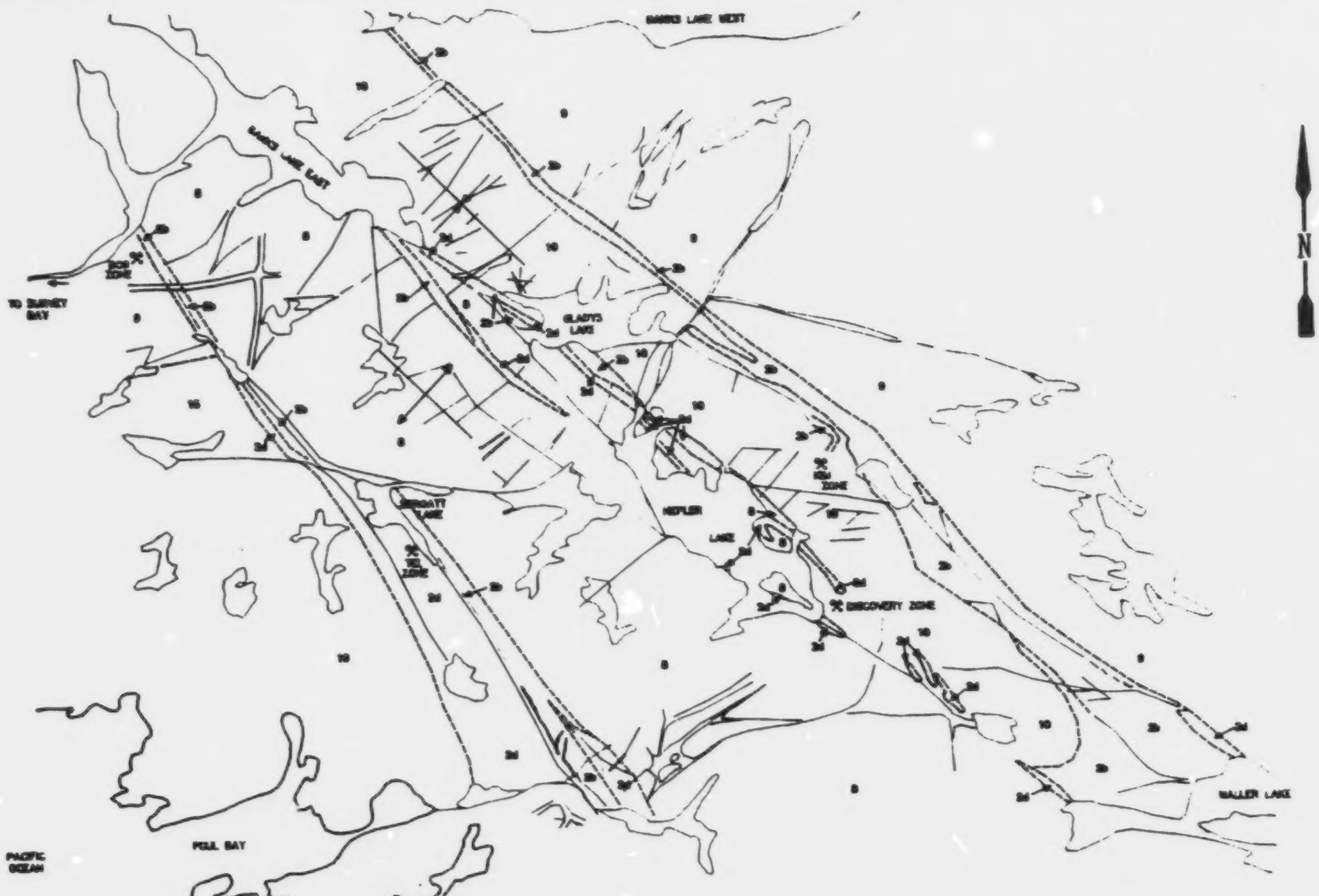
MILES 0 2
KILOMETRES 0 3

RESOURCE ASSESSMENT

YELLOW GIANT PROSPECT
LOCATION MAP

TRM ENGINEERING LTD.

SCALE: 1:50,000	DATE: MARCH 1986
S. GARDINER	FIGURE: 1-A4a


BAIRD LAKE WEST
BAIRD LAKE EAST
TO SURVEY BAY
BOB ZONE
GLADYS LAKE
HEPLER LAKE
KIM ZONE
TEL ZONE
DISCOVERY ZONE
WALLER LAKE
PULL BAY
PACIFIC OCEAN
N
10
8
5
2b
2d

LEGEND

- 2b QUARTZITE, SILTSTONE
- 2d CRYSTALLINE LIMESTONE
- LINEAMENTS
- GEOLOGICAL CONTACTS
- 10 QUARTZ MONZONITE, GRANITE
- 8 GRANODIORITE
- 5 QUARTZ DIORITE
- ANTIFORM
- SYNFORM

NOTES: Reference: adapted from report by B. Manchuk (1977).

Drawn by: VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103G 8E

0 200 400 600 800 METERS

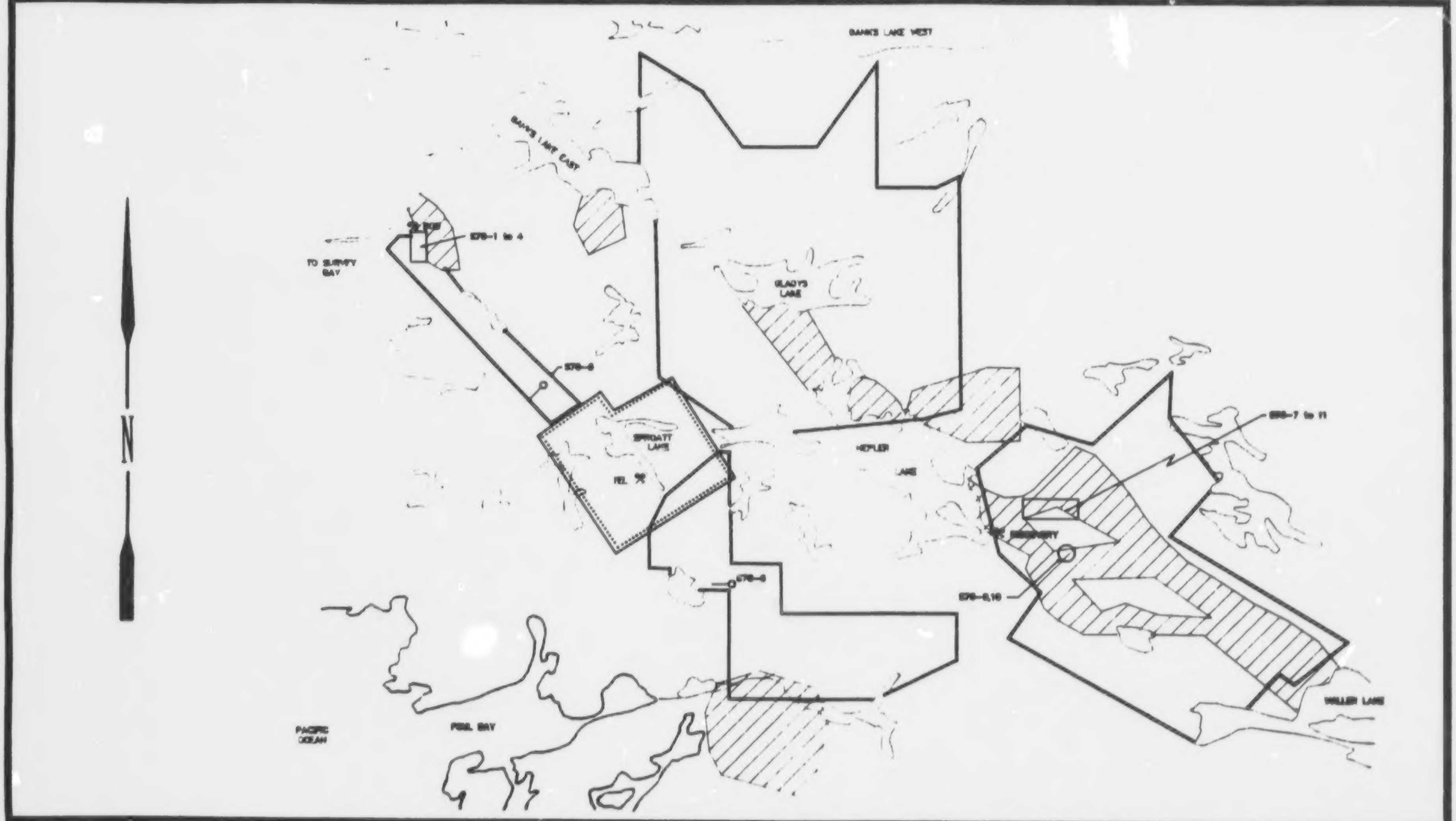
0 2000 4000 FEET

RESOURCE ASSESSMENT

YELLOW GIANT PROSPECT
SURFACE GEOLOGY PLAN

TRM ENGINEERING LTD.

SCALE: 1:32,650	DATE: MARCH 1986
S. GARDINER	FIGURE: I–A4B


N
BANK'S LAKE WEST
BANK'S LAKE EAST
TO SURVEY BAY
S76-1 to 4
S76-6
GLADYS LAKE
SPROATT LAKE
HEPLER LAKE
S76-5
S76-7 to 11
S76-9,10
DISCOVERY
PACIFIC OCEAN
FOIL BAY
WALLER LAKE

LEGEND

▨	FALCONBRIDGE 1963
☐	FALCONBRIDGE 1975
DIAMOND DRILLING S76-1 to 11	FALCONBRIDGE 1976
⬚	MCINTYRE-PORCUPINE 1964

NOTES: YELLOW GIANT
SURFACE EXPLORATION COMPILATION PLAN
AREAS OF GEOPHYSICAL, GEOCHEMICAL AND
DRILLING SURVEYS 1963 - 1976

Drawn by
VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103G 8E

0 200 400 600 800 METERS
0 2000 4000 FEET

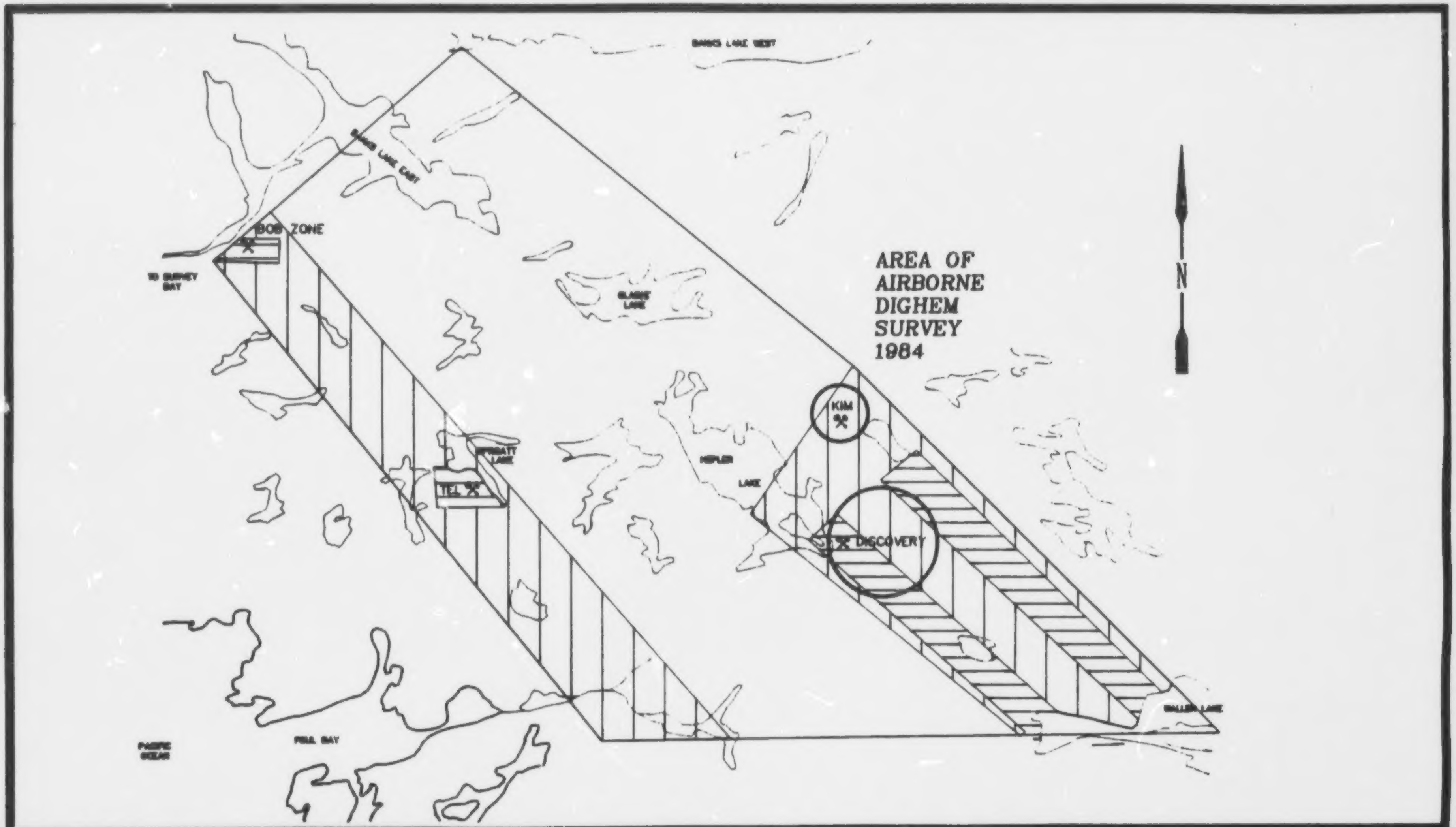
RESOURCE ASSESSMENT

YELLOW GIANT PROSPECT

COMPILATION PLAN OF WORK 1960 - 1976

TRM ENGINEERING LTD.

SCALE: 1:32,000
DATE: MARCH 1986
S. GARDINER
FIGURE: I-A4C


BANKS LAKE WEST
BANKS LAKE EAST
BOB ZONE
TO SURVEY BAY
AREA OF AIRBORNE DIGHEM SURVEY 1984
N
KIM
HEPLER LAKE
TEL
DISCOVERY
PACIFIC OCEAN

LEGEND

▥	1984–1985	GRID GEOLOGICAL AND RECONNAISSANCE GEOCHEMICAL SURVEYS
▤	1984–1985	GRID GEOCHEMICAL SURVEYS
○	1984	GEOPHYSICAL (I.P.) SURVEYS

NOTES: Reference: adapted from various company reports (1984–1986).

Drawn by:
VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103G 8E

0 200 400 600 800 METERS
0 2000 4000 FEET

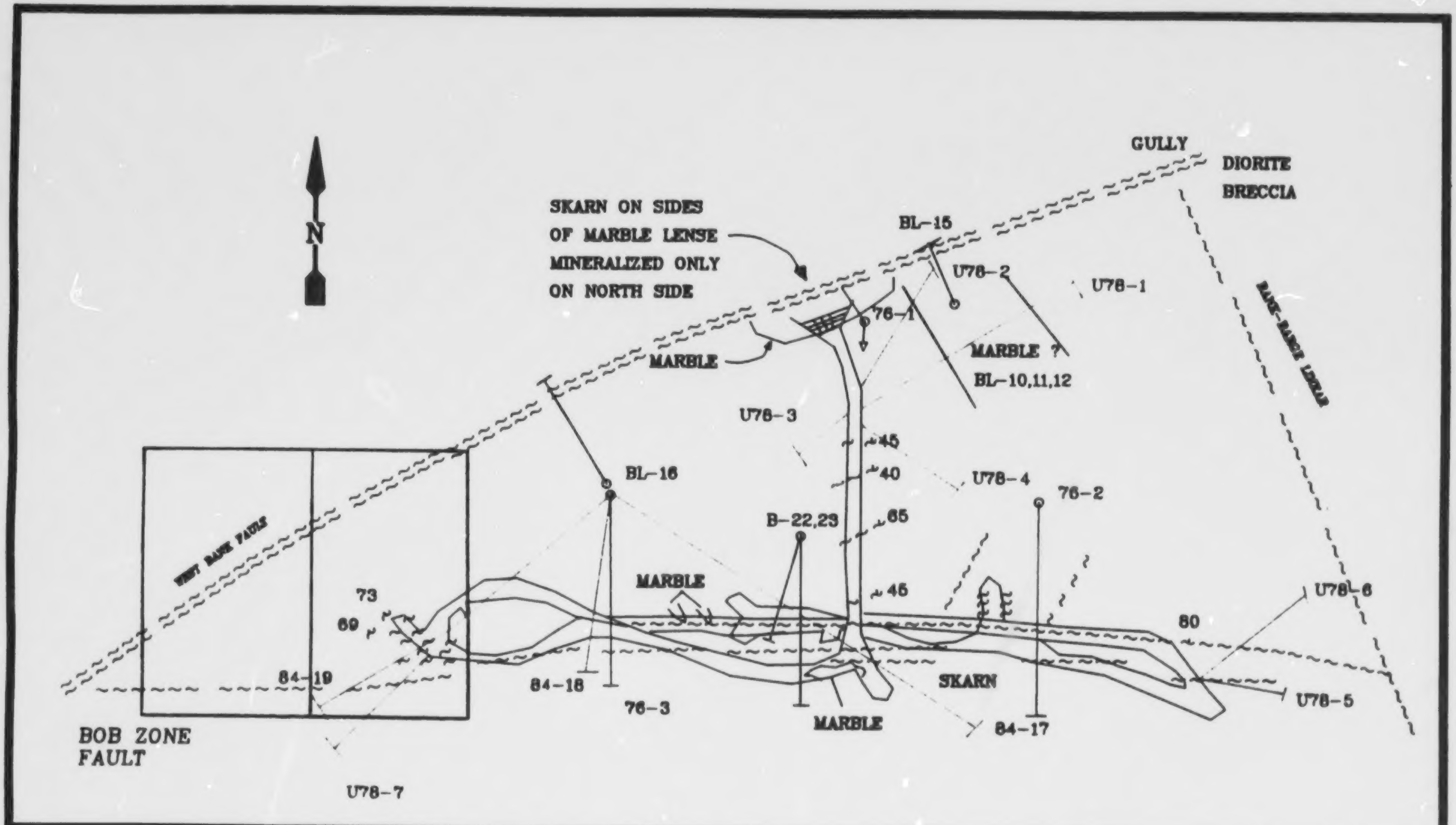
RESOURCE ASSESSMENT

YELLOW GIANT PROSPECT

COMPILATION PLAN OF WORK
TRADER RESOURCES CORP. 1983-86

TRM ENGINEERING LTD.

SCALE: 1:32,853	DATE: MARCH 1986
S. GARDINER	FIGURE: I–A4D


N
SKARN ON SIDES
OF MARBLE LENSE
MINERALIZED ONLY
ON NORTH SIDE
GULLY
DIORITE
BRECCIA
BL-15
U78-2
U78-1
76-1
MARBLE
MARBLE ?
BL-10,11,12
U78-3
45
40
65
46
U78-4
76-2
BL-16
B-22,23
WEST BANK FAULT
MARBLE
73
69
U78-6
80
84-19
84-18
76-3
SKARN
U78-5
MARBLE
84-17
BOB ZONE
FAULT
U78-7

LEGEND

SURFACE DIAMOND DRILL HOLE
UNDERGROUND DIAMOND DRILL HOLE
ATTITUDE OF FAULT
UNDERGROUND WORKINGS
(BL-69 HOLES) 1964 SURFACE PACKSACK & DIAMOND DRILLING BY FALCONBRIDGE
(76 HOLES) 1976 SURFACE DIAMOND DRILLING BY FALCONBRIDGE
(U78 HOLES) 1978 UNDERGROUND DIAMOND DRILLING BY SPROATT SILVER
(84 HOLES) 1984 SURFACE DIAMOND DRILLING BY TRADER
1985 AREA TESTED BY SURFACE DIAMOND DRILLING BY TRADER

NOTES: ROCK UNIT IS QUARTZ DIORITE
UNLESS OTHERWISE INDICATED
REFERENCE:
ADAPTED FROM REORT BY J. SHEARER (1984)

Drawn by:
VISTA [illegible], Vancouver, B.C.

N.T.S. 103G 8E

0 10 20 40 METERS

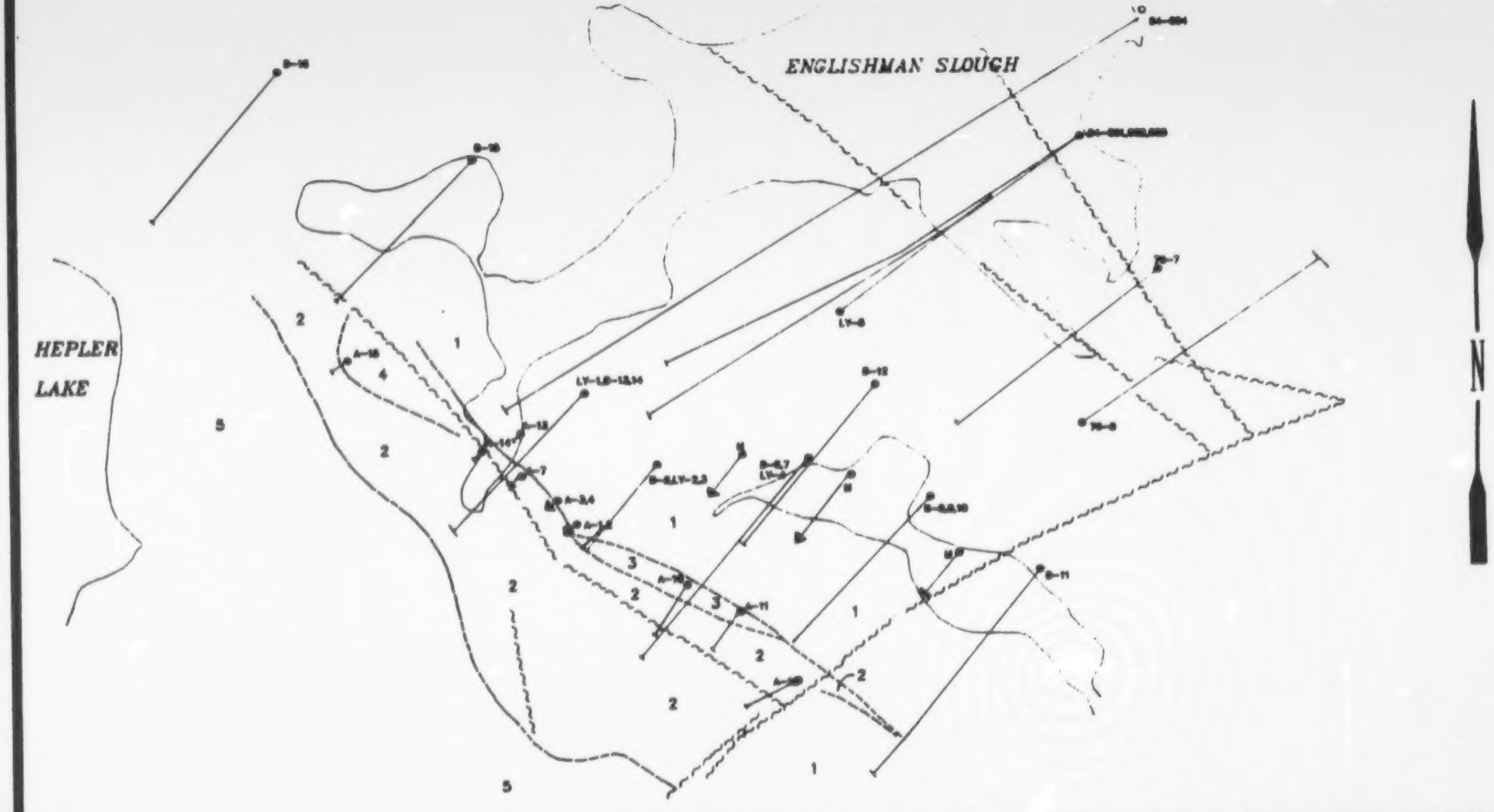
RESOURCE ASSESSMENT

YELLOW GIANT PROJECT

BOB ZONE, COMPOSITE SKETCH

TRM ENGINEERING LTD.

SCALE: 1:1000 (APPROX)
DATE: MARCH 1986
S. GARDINER
FIGURE: I-A4E


ENGLISHMAN SLOUGH
HEPLER LAKE
N
B-16
B-15
A-16
LY-1,8-12,14
A-13
A-7
A-3,4
A-1,2
B-6,LY-2,3
B-5,7
LY-4
B-12
B-8,9,10
B-11
A-11
LY-6
76-8
84-004
1
2
3
4
5

DISCOVERY ZONE :

(A-1,2,3,4,7,10-15)	1980	PACKSACK DRILLING BY FALCONBRIDGE
(LY1-5)	1963	DIAMOND DRILLING BY FALCONBRIDGE
(B-5 to 16)	1963	DIAMOND DRILLING BY FALCONBRIDGE
(76-7,8)	1976	DIAMOND DRILLING BY FALCONBRIDGE
(84-001 to 004)	1984	DIAMOND DRILLING BY FALCONBRIDGE
("14" HOLES)	1986	DIAMOND DRILLING BY TRADER

LEGEND

- 5 QUARTZ DIORITE
- 4 SKARN
- 3 METAGREYWACKE, QUARTZITE
- 2 LIMESTONE MARBLE
- 1 QUARTZ MONZONITE
- FAULT
- GEOLOGICAL CONTACT
- SURFACE DRILL HOLE

NOTES:

REFERENCE: ADAPTED FROM MAPS BY TRM ENGINEERING (1984)

Drawn by: VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103G 8E

0 10 20 30 40 50 METERS

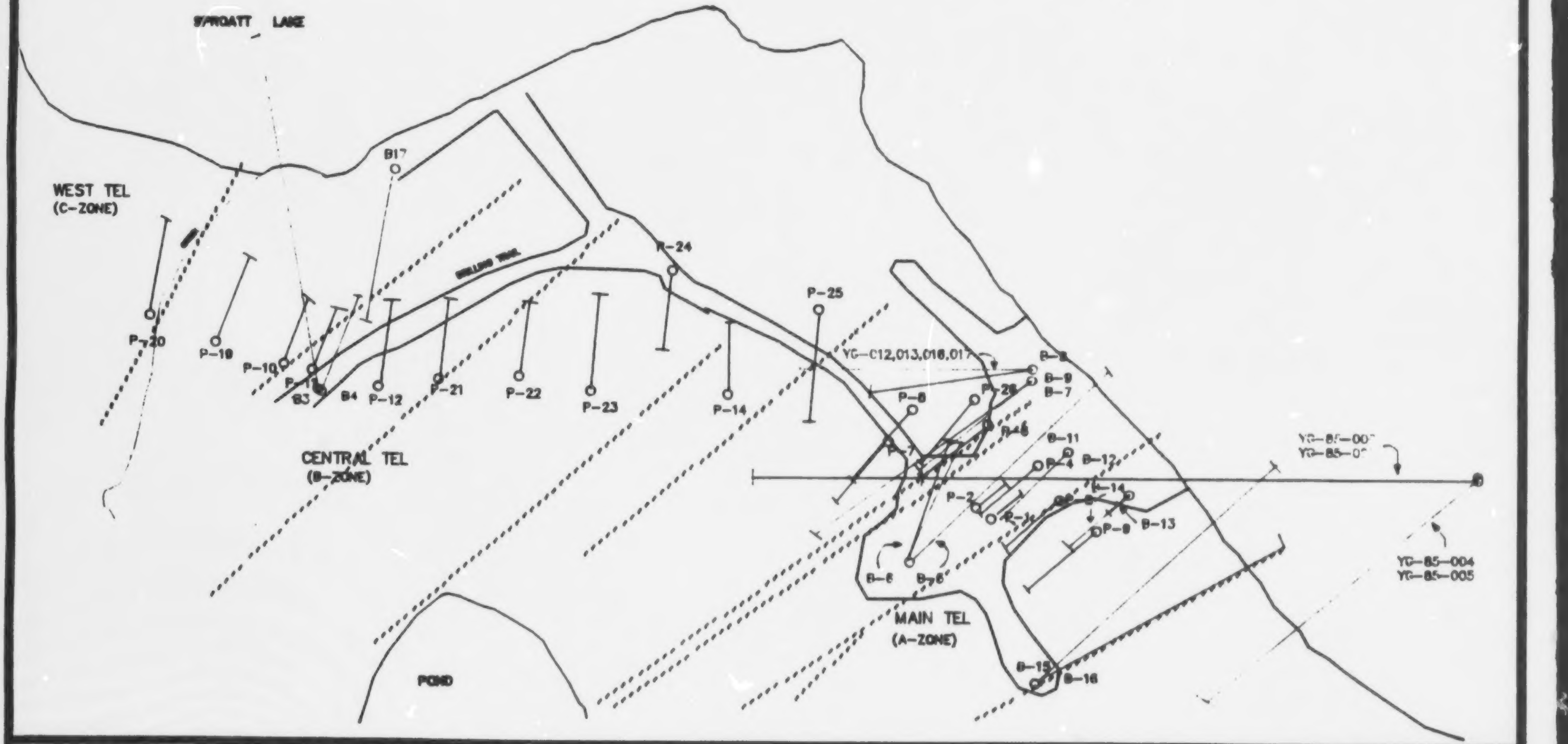
0 25 50 75 100 150 FEET

RESOURCE ASSESSMENT

YELLOW GIANT PROSPECT
DISCOVERY ZONE
GEOLOGY AND DRILLING PLAN

TRM ENGINEERING LTD.

SCALE: 1:1820 (approx.)	DATE: MARCH 1986
S. GARDINER	FIGURE: I-A4f


SPROATT LAKE
WEST TEL
(C-ZONE)
CENTRAL TEL
(B-ZONE)
MAIN TEL
(A-ZONE)
POND
DRILLING TRAIL
B17
P-20
P-19
P-10
P-11
B3
B4
P-12
P-21
P-22
P-23
P-24
P-14
P-25
YG-C12,013,016,017
P-8
P-26
B-8
B-9
B-7
B-4B
B-11
B-12
P-4
P-2
P-1
B-14
B-13
P-9
B-6
B-5
B-15
B-16
YG-85-00
YG-85-0
YG-85-004
YG-85-005

LEGEND

∼ FAULT

("P" HOLES) 1964 PACKSACK DRILLING BY McINTYRE-PORCUPINE MINES

("B" HOLES) 1975 DIAMOND DRILLING BY SPROATT SILVER MINES

("YG" HOLES) 1985 DIAMOND DRILLING BY TRADER RESOURCE CORP.

REFERENCE: ADAPTED FROM MAP BY TRM ENGINEERING (1985)

NOTES:
1986 DRILLING PROGRAM (79100 METRES) WHICH COVERS MUCH OF THE AREA SHOWN IS PRESENTLY IN PROGRESS

Drawn by: VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103G 8E

0 10 20 30 METERS
0 50 100 FEET

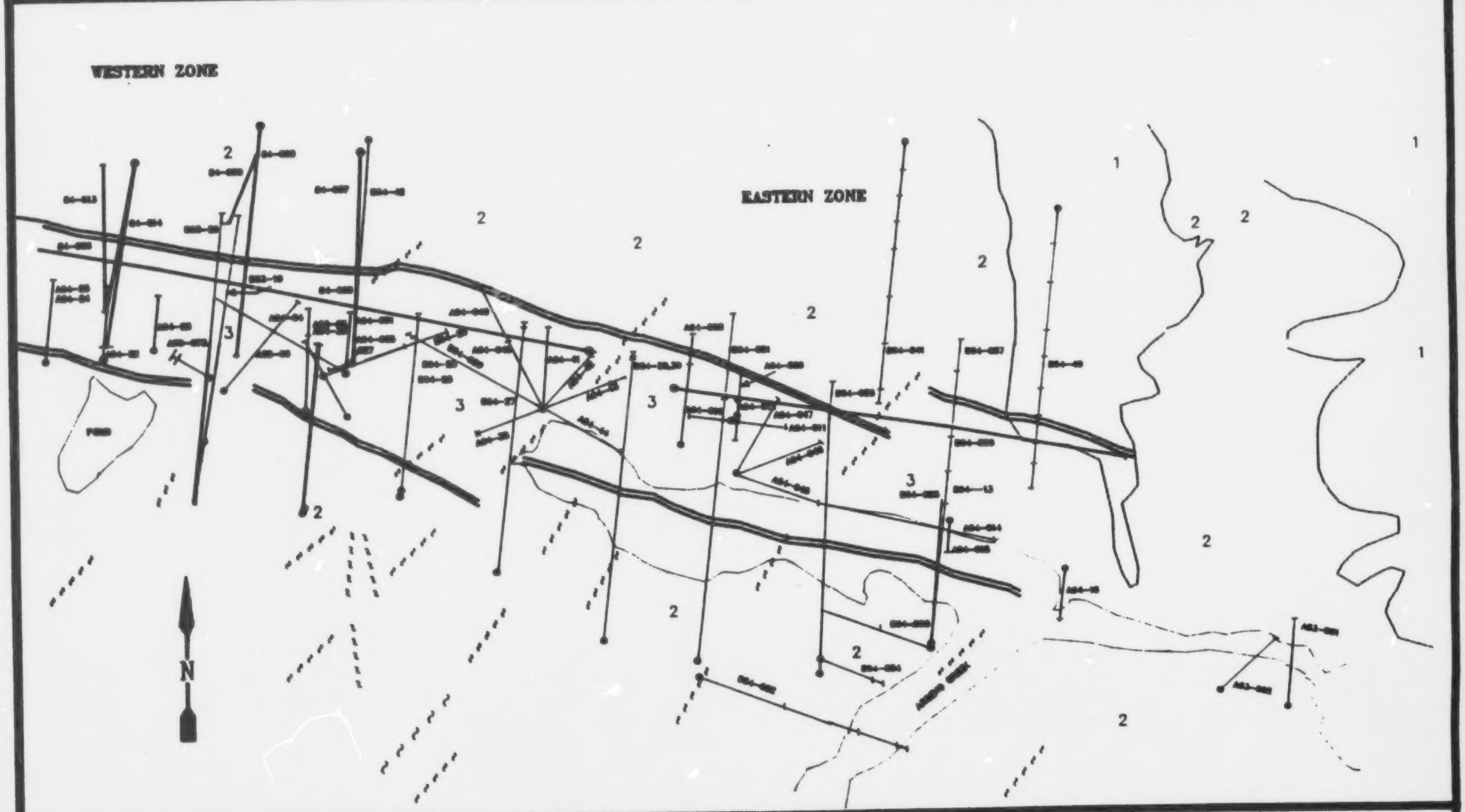
RESOURCE ASSESSMENT

YELLOW GIANT PROJECT

TEL ZONE, DRILLING PLAN

TRM ENGINEERING LTD.

SCALE: 1:1160 (approx.)	DATE: MARCH 1986
S. GARDINER	FIGURE: I-A4G



LEGEND

o—| SURFACE DIAMOND DRILL HOLE

~ FAULT

═ OUTLINE OF ALTERATION ZONE

⁀ GEOLOGICAL CONTACT

3 ALTERATION ZONE

2 QUARTZ MONZONITE

1 SILTSTONE

o—| (A83 A84 HOLES) 1983,1984 PACKSACK DRILL HOLES BY FALCONBRIDGE

o—| (B83 B84 HOLES) 1983,1984 DIAMOND DRILL HOLES BY FALCONBRIDGE

o—| (84 HOLES) 1984 SURFACE DIAMOND DRILLING BY TRADER

NOTES:
REFERENCE:
ADAPTED FROM MAP BY J.SHEARER AND
L TANGUAY (1984)

Drawn by:
VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103G 8E

0 10 20 40 METERS

0 25 50 100 FEET

RESOURCE ASSESSMENT

YELLOW GIANT PROJECT
KIM ZONE
GEOLOGY & DRILLING PLAN

TRM ENGINEERING LTD.

SCALE: 1:1600

DATE: MARCH 1986

FIGURE: 1-A4H

2.3.1.5 Case Study #5 - Edye Pass (#76)

The Edye Pass prospect is located on the northern coast of Porcher Island, approximately 35 km southwestward from Prince Rupert. Access is by water. The property is shown on Figure I-A5a.

The Island is made up of muskeg covered foreshores around steep sided, domed mountains which reach elevations of 1200-1500 m. The portals of the Edye Pass Mine are at sea level. Those of the Surf Point Mine are about 110-120 m above sea level.

The climate at Edye Pass is similar to that of Prince Rupert. The mean daily temperature ranges from 2.7°C in the months of January to March to 13.2°C in the months of July to September. Total average annual precipitation is about 2400 mm and approximately 113 cm of snowfall may be expected.

The property is underlain by diorite of the Coast Plutonic complex, which is cut by andesite and basalt dykes, and metasedimentary rocks belonging to the Prince Rupert Formation of Alexander Terrane. Quartz veins occur in the diorite. The veins contain small irregular lenses of pyrite with associated gold mineralization. Warren (1936) reports that the gold telluride sylvanite is also present in the Surf Point veins. Figure I-A5b is a plan of the geology and workings at Edye Pass.

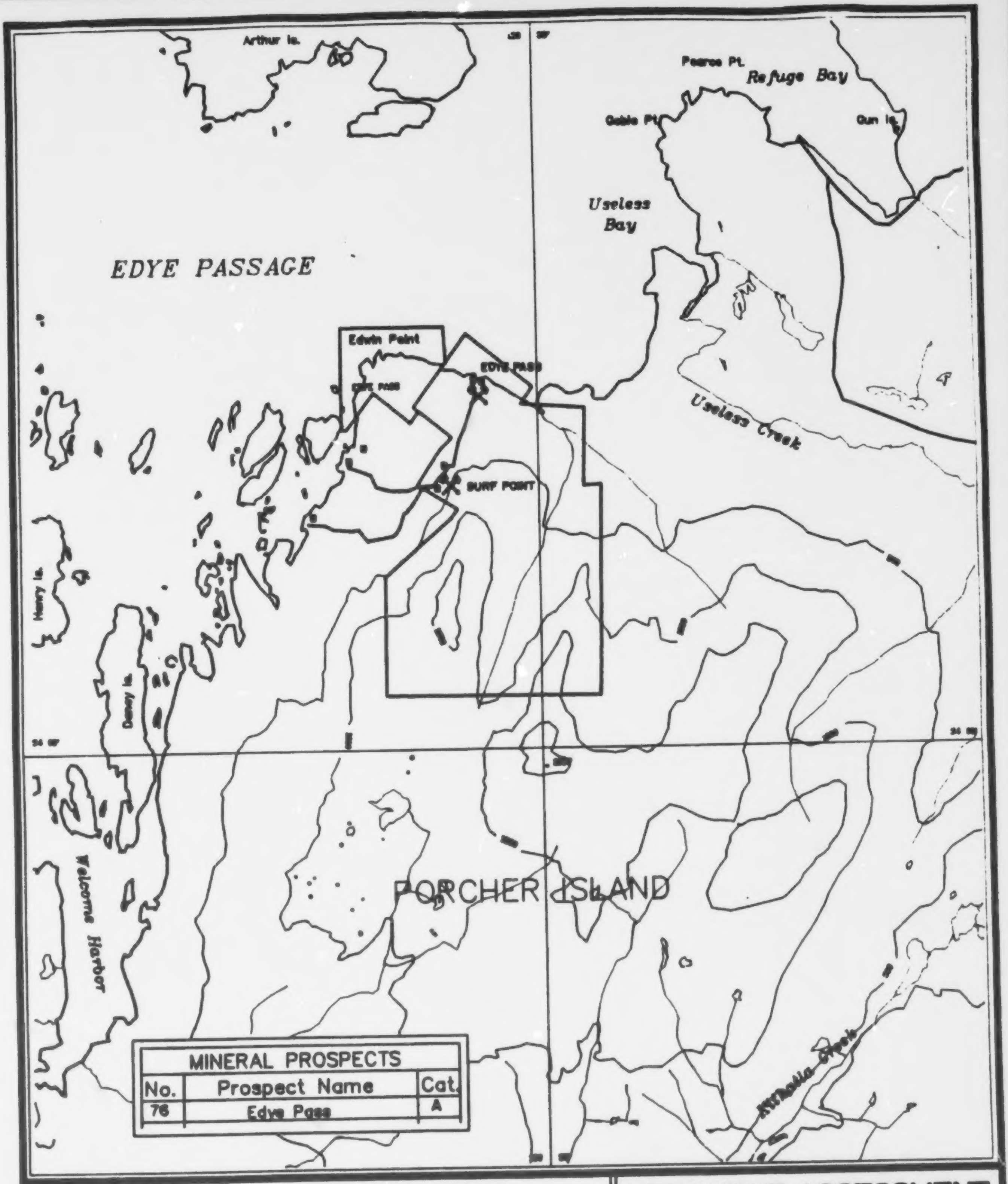
The Edye Pass and Surf Point properties were staked in the early 1900's and were known as the Trixie property. Surface exploration had been carried out and several shipments of high grade ore made from open cuts prior to 1932.

Between 1916 and 1932 the Surf Point Mine was developed with 3 adits by the N.A. Timmins Corp. By 1938 in excess of 2300 m of development was completed. In 1937, the Reward Mining Company, which owned and developed the Edye Pass Mine, purchased the Surf Point Mine. Porcher Island Mines was formed during 1938 and operated both mines. The company constructed a 50 ton per day mill and did limited development work in the Edye Pass Mine.

In 1975 the property was optioned by Tombill Mines Ltd. which drilled 8 holes on the 1015 level of the Edye Pass Mine. This work is shown on Figure I-A5b.

In 1975 and 1977 geochemical and geophysical surveys were carried out on the property. In 1976 Carolin Mines Ltd. evaluated the potential of the deposits for bulk mining possibilities. Banwan Gold Mines Ltd. optioned the property in 1978 and did limited surface diamond drilling. During 1979 and 1980 this company undertook an extensive underground exploration program. Geological mapping and sampling of the Edye Pass 1015 and 1110 levels of Surf Point Mine, and limited exploratory development were completed over 3400 m of underground diamond drilling. Present ore reserves, which consist of 266,000 tonnes at 8.9 g Au/T are based on the results of this work.

The property is currently held by Imperial Metals Corp.



Arthur Is.
Pearce Pt.
Refuge Bay
Gable Pt.
Gun Is.
Useless Bay
EDYE PASSAGE
Edwin Point
EDYE PASS
EDYE PASS
SURF POINT
Useless Creek
Henry Is.
Dolly Is.
Welcome Harbor
PORCHER ISLAND
Kitkatla Creek

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
76	Edye Pass	A

NOTES: contour interval 500 feet

Drawn by
VISTA GEO-GRAPHICS, Vancouver, B.C.

N.T.S. 103J 2E

MILES

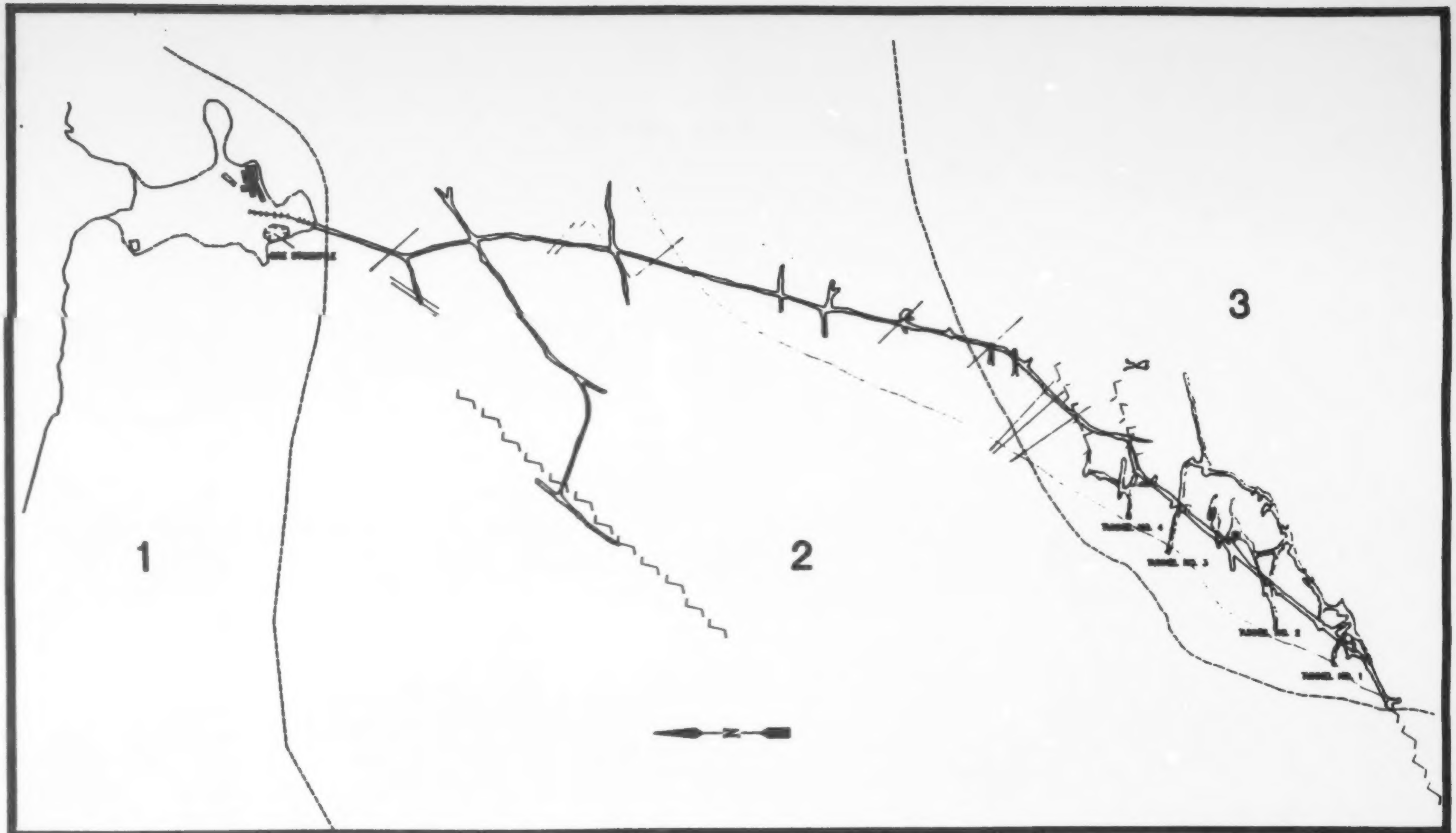
KILOMETRES

RESOURCE ASSESSMENT

EDYE PASS PROSPECT
LOCATION MAP

TRM ENGINEERING LTD.

SCALE: 1:50,000	DATE: MARCH 1988
S. GARDINER	FIGURE: I-A8e


1
2
3
N
TUNNEL NO. 4
TUNNEL NO. 3
TUNNEL NO. 2
TUNNEL NO. 1

LEGEND

- QUARTZ DIORITE
- HORNBLENDE QUARTZ DIORITE
- PRINCE RUPERT SCHIST
- ANDESITE DYKE
- BASALT DYKE
- FAULT
- 1015 LEVEL (FORMER EDYE PASS MINE)
- 1110 LEVEL (FORMER SURF POINT MINE)

NOTES:
REFERENCE: FROM REPORT BY
DEARIN (1980)

Drawn by
VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103J 2E

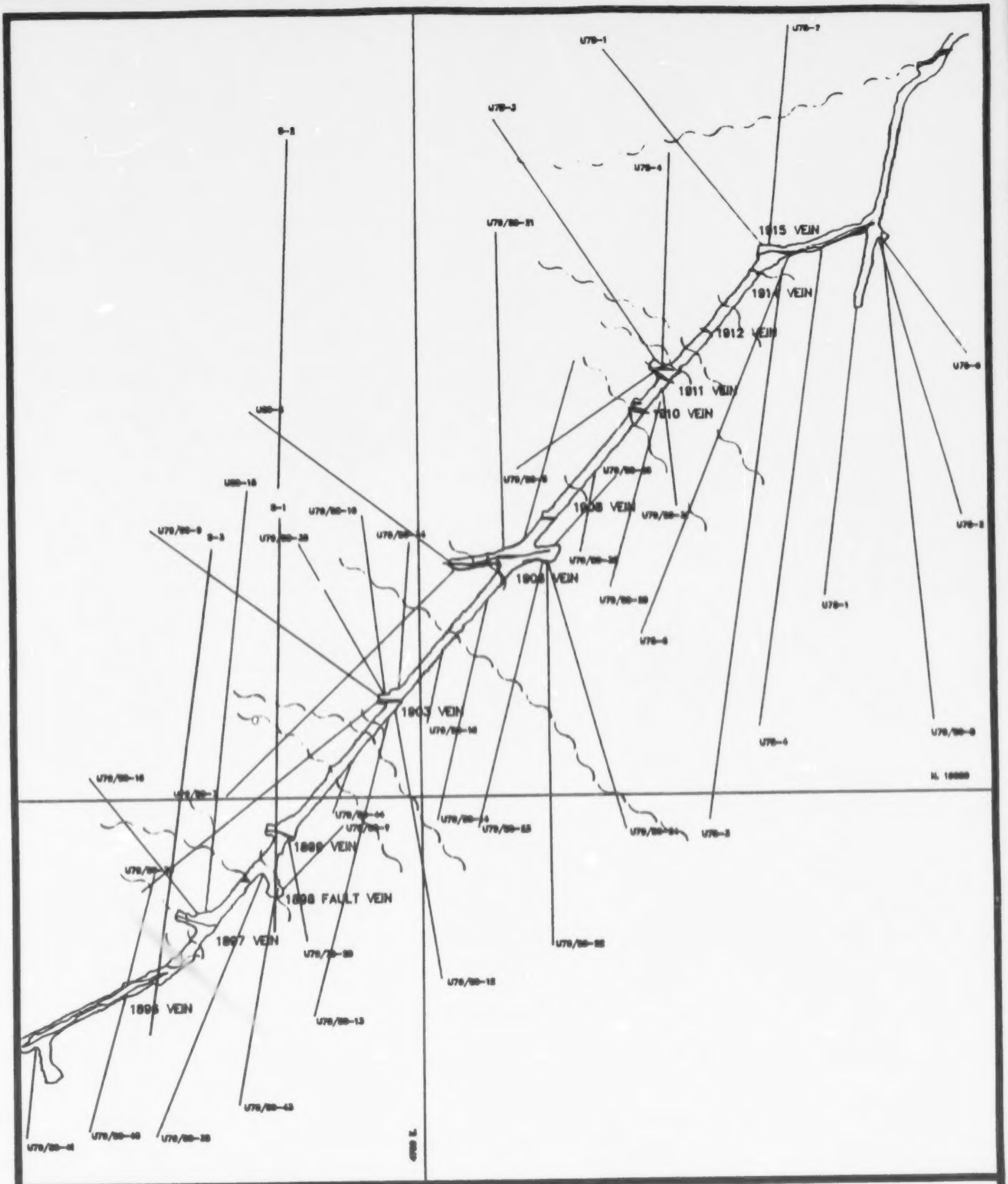
RESOURCE ASSESSMENT

EDYE PASS PROSPECT

PLAN OF GEOLOGY AND WORKINGS

TRM ENGINEERING LTD.

SCALE: 1:4375	DATE: MARCH 1986
S. GARDINER	FIGURE: I-A5B



1915 VEIN
1914 VEIN
1912 VEIN
1911 VEIN
1910 VEIN
1908 VEIN
1906 VEIN
1903 VEIN
1899 VEIN
1898 FAULT VEIN
1897 VEIN
1896 VEIN
S-2
S-1
S-3

LEGEND

UNDERGROUND WORKINGS
FAULT
VEIN
UNDERGROUND DIAMOND DRILL HOLE
PROJECTION OF SURFACE DIAMOND DRILL HOLE
S-2

NOTES:

REFERENCE: ADAPTED FROM REPORT BY DEARIN (1980)

Drawn by: VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103J 2E

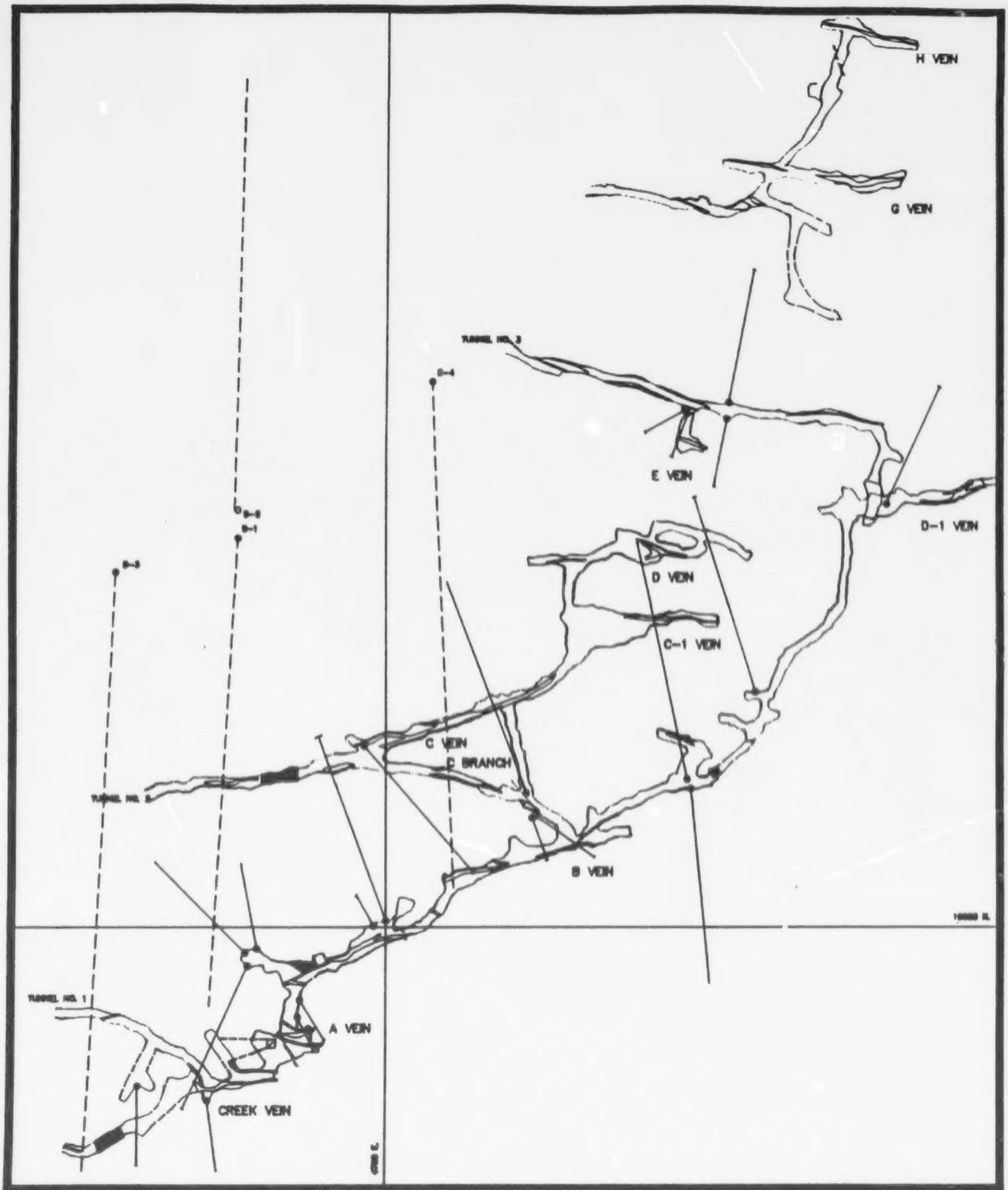
RESOURCE ASSESSMENT

EDYE PASS PROSPECT

GEOLOGY AND WORKINGS 1015 LEVEL

TRM ENGINEERING LTD.

SCALE: 1:1360	DATE: MARCH 1986
S. GARDINER	FIGURE: I-A5C


H VEIN
G VEIN
TUNNEL NO. 3
D-4
E VEIN
D-1 VEIN
D-6
D-1
D-3
D VEIN
C-1 VEIN
C VEIN
C BRANCH
TUNNEL NO. 2
B VEIN
TUNNEL NO. 1
A VEIN
CREEK VEIN

LEGEND

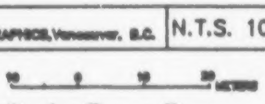
- UNDERGROUND WORKINGS surveyed, unsurveyed
- FAULT
- VEIN
- UNDERGROUND DIAMOND DRILL HOLE
- PROJECTION OF SURFACE DIAMOND DRILL HOLE
- RAISE
- WINZE
- STOPES TO SURFACE

NOTES:

REFERENCE: ADAPTED FROM REPORT BY DEARIN (1980)

Drawn by:
VISTA GEO-GEOGRAPHICS, Vancouver, B.C.

N.T.S. 103J 2E


10
0
10
20
METRES
20
0
20
60
FEET

RESOURCE ASSESSMENT

EDYE PASS PROSPECT
PLAN OF WORKINGS - SURF POINT MINE
1110 LEVEL

TRM ENGINEERING LTD.

SCALE: 1:100	DATE: MARCH 1986
S. GARDINER	FIGURE: I-A5D

Category B - Properties of Moderate Potential

2.3.2 Properties of Moderate Potential for Use of a Portable Mill

Thirty-six properties were assigned to category B. The deposits are primarily sulphide bearing quartz veins with associated precious metals. The second most abundant deposit types are skarns and replacements. The reserves are generally large, often greater than 100,000 tonnes, and the mineralization consists dominantly of base metals. Most of these properties have past mining histories and have produced an aggregate of 10,062.3 Kg of gold.

Reserve and production data are summarized in Table B. Information regarding location and access, exploration history and geology is given on the data sheets in Appendix B. The prospects are shown on the index map, Figure I-2 and on location maps.

TABLE B
DEPOSITS OF MODERATE POTENTIAL

INV. #	NAME	LOCATION				DEPOSIT TYPE	RESERVES			PRODUCTION HISTORY			
		LATITUDE		LONGITUDE			TONNAGE (Tonnes)	GRADE (g/T or %)	REFERENCE	DATE	TONNAGE (Tonnes)	AMOUNT (kg)	COMMODITY
		°	'	°	'								
1	SUNRO MINE	48	25.6	124	02.1	SHEAR/ REPL.	423,829	1.33 Cu	MINFILE (1982)	1962-78	1,323,034	899.3 2,262.7 13,754,271	Au Ag Cu
3	MOUNT SICKER	48	51.9	123	41.7	MASS SULF/ REPL.	-	-	-	1898-1909, 1943-1952, 1964	277,899	1,171.5 10,819.3 9,549,594 164,587 1,962,111	Au Ag Cu Pb Zn
5	THISTLE	49	06.5	124	58.1	REPL.				1938-42	6,238	85.9 66.9 309,088	Au Ag Cu
9	KALLAPA	49	11.7	125	51.5	VEIN/ SHEAR	-	-	-	1913-14	1,372	17.7 110.2 27,380	Au Ag Cu
19	DANZIG	49	37.2	126	21.4	REPL.	27,215	MEDIUM GRADE Zn	MRI 80/7	1934-38	130	5.6 10.2 87	Au Ag Cu
20	WAR EAGLE (MAGGIE)	49	38.7	123	02.2	VEIN	9,072	13.71 Au	PERS. COMM. (1986)	1984	51.7	1.8 4.3 799 2,360	Au Ag Cu Zn
21	DOCTORS POINT	49	39	122	00	VEIN/ FRACT	226,796	3.43 Au 68.56 Ag	MINING REVIEW (1985)				
25	TEXADA ISLAND	49	45	124	33	SKARN	598,742	FeO ORE	PERS. COMM. (1986)	1896-1929, 1948-1952, 19[illegible]	2,962,135	1,750.1 27,275.4 4,936,006	Au Ag Cu
31	ASHLU	49	56.8	123	24.6	VEIN	16,760	6.86 Au	T. KENNEDY (1986)	1932-39	13,652	20.2	Au
36	MOUNT ZEBALLOS	50	00.8	126	18.6	SHEAR	-	-	-	1939-42, 1944	74,268	51.5 946.6 444,399 2,408 12,726	Au Ag Cu Pb Zn
38	HOMEWARD	50	01	126	45.8	VEIN/ SHEAR	-	-	-	1940-42	3,586	46.4 108.7 318 347	Au Ag Cu Pb
39	VAN ISLE	50	01.3	126	49.9	VEIN	-	-	-	1940	3,044	35.9 16.5	Au Ag

TABLE 8
DEPOSITS OF MODERATE POTENTIAL

DIV. #	NAME	LOCATION				DEPOSIT TYPE	RESERVES			PRODUCTION HISTORY			
		LATITUDE		LONGITUDE			TONNAGE (Tonnes)	GRADE (g/T or %)	REFERENCE	DATE	TONNAGE (Tonnes)	AMOUNT (kg)	COMMODITY
		°	'	°	'								
41	WHITE STAR	50	01.3	126	48.3	VEIN	-	-	-	1935-42, 1952, 1957	1,293	220.9 92.5 1,563 17,144 30	Au Ag Cu Pb Zn
42	C.D.	50	01.3	126	47.6	VEIN	-	-	-	1938-41	5,645	143.1 44.3 470 2982	Au Ag Cu Pb
45	CENTRAL ZEBALLOS	50	02.1	126	47	SHEAR/ VEIN	-	-	-	1938-47	52,296	636.7 432.2 7,370 71,140	Au Ag Cu Pb
48	COPPER ROAD	50	11.3	125	18	SHEAR	151,345	3.26 Cu	MRI 80/7	1953-68	4,736	715 g 25.4 182,878	Au Ag Cu
49	LUCKY JIM	50	12.3	125	16.2	SKARN	90,724 (PROVEN) 18,143 (INDICATED)	13.1-20.6 Au 51.4-68.6 Ag 2-8 Cu	PERS. COMM. (1986)	1906, 1916, 1927	478	7.4 7.1 11,274	Au Ag Cu
50	INDEPENDENT	50	21.5	127	14	SKARN	753,000	0.68 Au 1.6 Cu 31.5 Fe	MINFILE (1982)	1968-69	24,905	62.9 488.5 1,237,176	Au Ag Cu
51	COAST COPPER (OLD SPORT)	50	22.6	127	14.7	SKARN	454,507	0.69 Au 1.3 Cu 33.3 Fe	MINFILE (1982)	1962-73	2,652,593	3,868.8 11,731.2 41,930,033 488,726,155	Au Ag Cu Fe
53	ALICE LAKE MINES	50	25.9	127	23.9	REPL.	3,630	0.69 Au 34.28 Ag 12.7 Zn	(CATHERINE DEPOSIT)				
							46,267	32.57 Ag 8.7 Zn	(ALICE LAKE DEPOSIT) MINFILE (1982)				
55	YREKA	50	27.3	127	34	SKARN	350,173	1.37 Au 34.3 Ag 2.5 Cu	MINING REVIEW (1985)	1902-04, 1917, 1966-67	145,344	49.9 4,537.1 3,935,873	Au Ag Cu
56	ALEXANDRIA	50	29.7	125	22.7	VEIN/ SHEAR	24,495	9.98 Au	PERS. COMM. (1986)	1940	1,695	22.2 40.6 1763	Au Ag Cu
57	DORATHA-MORTON	50	30.9	125	24.5	SHEAR	18,143	8.57 Au 17.14 Ag	PERS. COMM. (1986)	1898-1925	9,303	143 330.7 1,090	Au Ag Cu

TABLE 8
DEPOSITS OF MODERATE POTENTIAL

		LOCATION				DEPOSIT TYPE	RESERVES			PRODUCTION HISTORY			
INV. #	NAME	LATITUDE		LONGITUDE			TONNAGE (Tonnes)	GRADE (g/T or %)	REFERENCE	DATE	TONNAGE (Tonnes)	AMOUNT (kg)	COMMODITY
		°	'	°	'								
59	CALEDONIA	50	38.5	127	36	SKARN/ REPL.	68,040	0.34 Au 704.1 Ag 6.1 Cu 7.45 Zn 0.6 Pb	MRI 80/7	1929	1	467 g 66	Au Cu
61	IKEDA MINE	52	17.6	131	10.9	SKARN/ REPL.	22,750	1.5-2 Cu SOME Au AND Ag	B.C. EMPR BULL. 54 (1964)	1906-1920	13,410	51.2 862.5 574,055	Au Ag Cu
74	ECSTALL	53	52.4	129	30.6	REPL.	589,670	1.03 Au 34.28 Ag 1.91 Cu 2.3 Zn 42.75 Fe	MRI 80/7				
78	BONANZA, BLACK BEAR	55	23.7	129	50.9	MASS SULF	226,800	1.0 Cu	MRI 80/7	1929-35	UNKNOWN	86.6 8,747.5 14,312,617	Au Ag Cu
79	GRANBY POINT	55	24.8	129	47.8	VEIN	-	-	-	1917-38	56,287 GRANBY POINT & GOLSKEISH	329.4 6,926.3	Au Ag
82	OUTSIDER GROUP	55	28.5	130	0.1	VEIN	181,440	1.58 Cu	MINFILE (1982)	1906-07 1924-28	125,966	2.1 151.8 2,388,798	Au Ag Cu
87	LUCKY SEVEN	55	58.2	129	54.6	VEIN	11,193	2.23 Au 208.77 Ag 1.58 Pb 1.87 Zn	MRI 80/7	1911-12	8,164	19.0 804.6 127,046	Au Ag Pb
88	DUNWELL	55	59.6	129	55.2	VEIN	-	-	-	1926-31	45,709 MILLED	307.2 10,257.9 12,253 838,160 1,108,858	Au Ag Cu Pb Zn
91	INDIAN	56	04.6	130	03.0	VEIN/ STWK	-	-	-	1925, 1947, 1952-53	12,780	3.9 154.0 565,579 707,331	Au Ag Pb Zn
92	RED CLIFF	56	05.8	129	53.6	VEIN	-	-	-	1912,	1168	5.0 1.2 40,431	Au Ag Cu
										1973	3003	?	

TABLE B
DEPOSITS OF MODERATE POTENTIAL

INV. #	NAME	LOCATION				DEPOSIT TYPE	RESERVES			PRODUCTION HISTORY			
		LATITUDE		LONGITUDE			TONNAGE (Tonnes)	GRADE (g/T or %)	REFERENCE	DATE	TONNAGE (Tonnes)	AMOUNT (kg)	COMMODITY
		o	'	o	'								
93	SILVER BUTTE	56	06	130	02	VEIN	-	-	NO RESERVE DATA PUBLISHED				
94	GEORGE Au-Cu (BEAR PASS)	56	06.2	129	45.9	VEIN & DISS	100,890 to 455,000	2.06 Au 17.14 Ag 1.2 Cu	MRI 80/7				
96	GOAT	56	09.1	129	33.6	VEIN	27,300	10.28 Au 4,446.4 Ag	PERS. COMM. (1986)	1979, 1980	1,358	Unknown	

2.3.3 Category C - Properties of Low Potential for Use of a Portable Mill

Category C consists of 17 properties. Deposit types include massive sulphides, veins, replacements, skarns, and porphyries. As a group, these deposits have the largest reserves and many have long production histories. Table C shows reserve and production figures for these properties. The prospects are shown on the index map, Figure I-2.

2.3.4 Category D - Properties of Uncertain Potential

There are 39 properties in Category D. This is not a comprehensive listing of all properties with an exploration potential but serves to illustrate the distribution of gold occurrences within the study area. The deposit types are diverse. Production, if any, has been small. The exploration history of the properties is given in Table C and the locations are shown on the index map, Figure I-2.

TABLE C
LARGE TONNAGE DEPOSITS AND THOSE WITH MILL FACILITIES

INV. #	NAME	LOCATION				DEPOSIT TYPE	RESERVES			PRODUCTION HISTORY			
		LATITUDE		LONGITUDE			TONNAGE (Tonnes)	GRADE (g/T or %)	REFERENCE	DATE	TONNAGE (Tonnes)	AMOUNT (kg)	COMMODITY
		°	'	°	'								
11	AGASSIZ-WEAVER	49	19.2	121	57.5	MASS SULF	1,506,380	0.823 Au 41.14 Ag 0.63 Cu 0.15 Pb 3.57 Zn	MINING REVIEW (1985)	1969	270		4.11 g/T Au 154.26 g/T Ag 1.55% Cu 8.15% Zn
16	INDIAN CHIEF	49	26.9	126	18.8	REPL.	1,234,497	1.5 Cu	MRI 80/7	1904-38	73,608	22.5 1,707.4 1,102,364	Au Ag Cu
17	COPPER BAY	49	30.2	123	20.2	SHEAR/ FRACT	251.4 M	0.27 Cu 0.01 Mo 1.37 Ag 0.04 Au	MINFILE (1982)				
18	BRITANNIA	49	36.7	123	08.5	MASS SULF	362,808	1.26 Cu 6.85 Ag	MINFILE (1982)	1905-77	47,884,558	15,336.0 180,845.1 516,959,750 15,563,009 125,290,668	Au Ag Cu Pb Zn + Cd
24	HOLLY	49	43	124	34	SHEAR			NO RESERVE DATA PUBLISHED	1985-86	UNKNOWN	UNKNOWN	Au
28	DOMINEER-MT. WASHINGTON COPPER	49	45.2	125	00	VEIN/ PORPH	-	-	-	1961-67	381,773	130.8 7,235.2 3,548,191	Au Ag Cu
47	WARMAN (NORTHAIR)	50	07.9	123	06.2	VEIN	110,812	8.91 Au 34.62 Ag 2.66 Pb 3.84 Zn	MINFILE (1982)	1974-79	316,200	3,893.6 21,853.0 196,601 3,424,588 4,253,792	Au Ag Cu Pb Zn
58	COLOSSUS	50	31.7	125	11.5	DISS	118,300 117,936	2.3 Cu 2.5 Cu	MRI 80/7 MINFILE (1974)				
64	TASU	52	45.7	132	02.8	SKARN	5,457,680	44.9 Fe 0.3 Cu	MINFILE (1982)	1914-17, 1967-83	20,833,960	1,381.8 50,394.0 59,866.3	Au Ag Cu
72	CINOLA	53	31.6	132	13.0	VEIN/ FRACT	3,431,600	2.06 Au	B.C. EMPR P. MAP 58 (1985)	1975	UNKNOWN	902 g 529 g	Au Ag
81	ANYOX, HIDDEN CREEK	55	25.3	129	49.3	MASS SULF	18.144 M	0.86 Au 31 Ag 0.46 Cu 0.03 Co	B.C. EMPR P. MAP 58 (1985)	1914-36	21,725,524	3,772.8 206,308.9 321,546,202	Au Ag Cu

TABLE C
LARGE TONNAGE DEPOSITS AND THOSE WITH MILL FACILITIES

INV. #	NAME	LOCATION				DEPOSIT TYPE	RESERVES			PRODUCTION HISTORY			
		LATITUDE °	'	LONGITUDE °	'		TONNAGE (Tonnes)	GRADE (g/T or %)	REFERENCE	DATE	TONNAGE (Tonnes)	AMOUNT (kg)	COMMODITY
84	DOLLY VARDEN	53	41.1	129	31.4	REPL	1,553,503	326.4 Ag 0.53 Pb 0.82 Zn	MRI 80/7	1919-59	UNKNOWN DOLLY VARDEN TORBRIT TORIC SILVERTIP	3.9	Au
												100,433.5	Ag
												4,877,294	Pb
												190	Cu
												288,387	Zn
86	*PROSPERITY-PORTER IDAHO	55	55.3	129	57.2	SHEAR	898,000	668 Ag	B.C. EMPR MINERAL EXPL. REVIEW (1986)	1922-50	27,268	26.3	Au
												73,409.3	Ag
												27,232	Cu
												1,384,040	Pb
												8,747	Zn
90	SILBAK PREMIER	56	04	130	01.2	VEIN/ REPL	3,874,090	2.44 Au 110.38 Ag	B.C. EMPR P. MAP 58 (1985)	1918-68, 1976	4,236,689	56,116.6	Au
												1,270,970.6	Ag
												1,852,296	Cu
												24,778,736	Pb
												7,931,806	Zn
95	BIG MISSOURI	56	06.4	130	01.0	VEIN/ STWK	1,965,900	3.19 GOLD EQUIV.	B.C. EMPR P. MAP 58 (1985)	1927, 1931, 1938-42	768,941	1,815.9	Au
												1,638.4	Ag
												1,230	Pb
												1,778	Zn
98	GRANDUC MINE	56	13.1	130	20.8	DISS & MASS SULF	10,890,000	1.79 Cu	MINFILE (1982)	1971-78	13,027,064	1,683.1	Au
												10,369.7	Ag
												159,609,138	Cu
99	SCOTTIE GOLD	56	14.0	130	05	VEIN	113,375	17.15	B.C. EMPR P. MAP 58 (1985)	1981-85	63,851	813.7	Au

* Note: A barge mounted floatation concentrator, similar to that shown as Example A in Part II of this report, may be feasible provided that ore can be economically transported from mine to millsite.

TABLE D
DEPOSITS/PROSPECTS OF UNCERTAIN POTENTIAL

INV. #	NAME	LOCATION				DEPOSIT TYPE	EXPLORATION HISTORY	
		LATITUDE		LONGITUDE			DATE	ACTIVITY
		°	'	°	'			
2	VALENTINE MT.	48	30.8	123	52.8	FRACT/ DISS	1976	DISCOVERED AND STAKED BY BEAUPRE EXPLORATIONS
							1976-79	TREN, GEOC (ROCK & SOIL), BULK
							1980	TREN, GEOL, GEOC
							1981	GEOL, GEOC
							1982-83	SDD TOTALLING 828.8 m, GEOL, GEOC
							1984	TREN OF QUARTZ VEIN, 5.6 T BULK, RETURNED RESULTS OF 162 g Au/T, 12.7 g Ag/T, GEOP (AIRBORNE)
							1985	OPTIONED BY FALCONBRIDGE LTD., TREN, GEOC
4	LARA	48	52	123	52	MASS SULF	1981	STAKED BY LARAMIDE RESOURCES
							1982	OPTIONED BY ABERFORD RESOURCES
							1982-84	GEOC, GEOP (IP, MAGNETOMETER, VLF) GEOL, TREN
							1984	SDD - TOTALLING 12 HOLES, DISCOVERY OF CORONATION ZONE Zn, Pb, Cu, Ag, Au MINERALIZATION OVER TRUE WIDTH OF 8.3 m
							1985	SDD - TOTALLING 28 HOLES TRACED CORONATION ZONE 412 m LENGTH, 107 m DEPTH. TWO NEW ZONES DISCOVERED 84-40 ZONE HAS 3.7 m WIDTH Zn, Ag, Pb, Cu, Au MINERALIZATION.
							1986	ESTIMATE OF 270,000 M^3 AT 1.75 g Au/T, 3.84 g Ag/T, 1.98% Zn, 0.44% Cu, 0.36% Pb.
6	LEORA (DONALD)	49	08.1	125	24.6	VEIN	1902-03	STAKED
							1902	UG DEVELOPMENT IN 2 ADITS. NOTE RECORDS INDICATE MILL PRODUCTION FROM THIS PROPERTY AND NEARBY ROSEMARIE (SEE BELOW).
							1911-14	TRAMWAY INSTALLED, UG WORK INCLUDED SHAFT, STOPE, OWNER-DESIGNED MILL OPERATED.
							1931	NEW SHAFT, DRIFT, FROM LOWER ADIT.
							1902, 1909, 1910, 1914, 1915	PRODUCTION - 383 T 8.8 Kg Au, 2.8 Kg Ag
							1979	UG SAMP, GEOL BY LACANA
							1985	DD ON LEORA BY DISCOVERY GOLD EXPL.
7	ROSE MARIE	49	09.4	125	25.1	VEIN	1899	AMALGAMATION 4 STAMP MILL INSTALLED (SEE NOTE ABOVE IN LEORA)
							1900	PRODUCTION 9 T 902 g Au, 1.9 Kg Ag
8	VICTORIA	49	10.6	124	36.7	VEIN	1899, 1934-36	PRODUCTION - 365 T 9.4 Kg Au, 1.7 Kg Ag, 88 Kg Cu
							1974	SAMP, GEOL BY KEY WEST RESOURCES
							1976	GEOL, GEOC BY WESTERN MINES

TABLE D
DEPOSITS/PROSPECTS OF UNCERTAIN POTENTIAL

INV. #	NAME	LOCATION				DEPOSIT TYPE	EXPLORATION HISTORY	
		LATITUDE		LONGITUDE			DATE	ACTIVITY
		o	'	o	'			
12	RN MINE	49	20	121	44	VEIN	LATE 1970'S	UG WORK INCLUDED EXCAVATION OF ADIT (50 m). 37 T BULK HAD AN AVERAGE GRADE OF 37 g Au/T
							1983	PROPERTY EVALUATED BY ABO OIL, 1100 T BULK TAKEN HAD AN AVERAGE GRADE OF 45 g Au/T.
							1983-84	GEOL, GEOC, SDD. SDD RESULTS INCLUDE 22 m AT 4.7 g Au/T, 4.0 m AT 4.6 g Au/T.
							1985	OPTIONED BY KERR ADDISON MINES. GEOL, TREN, TEST PIT EXCAVATING, BLAST HOLE SAMPLING, SDD, BULK.
13	AUFEAS	49	20.7	121	29.2	VEIN/ SHEAR	1911	ACQUIRED BY AUFEAS GOLD MINING CO. UG WORK CONSISTED OF DRIFT, XCUT ON 2 VEINS.
							1913	PLANNED TO INSTALL MILL, SMALL PRODUCTION.
							1915	OPERATION SUSPENDED.
							1937-40	MINING AND MILLING OPERATIONS BY NORTHWEST VENTURES LTD. MILLING REVEALED 22% ARSENIC IN CONCENTRATE.
							1913, 1937-40	PRODUCTION - 419 T 11.4 Kg Au, 12.2 Kg Ag 2,683 Kg Cu.
							1985	WORK BY SILVER CLOUD MINES. UG DEVELOPMENT 51.8 m (170') TUNNEL EXCAVATED TO INTERSECT OLD WORKINGS. UDD TOTALLING 4 HOLES. SDD AND UDD TOTALLED 600 m
							1986	SDD
14	PROSPER	49	23.9	125	44.6	REPL	1935	GOLD-BEARING QUARTZ VEIN DISCOVERED.
							1941	UG DEVELOPMENT - DRIFT
							1942-50	PRODUCTION - 90 T 6.7 Kg Au, 6.3 Kg Ag, 37 Kg Cu.
							1947	DEVELOPMENT ON 2 LEVELS TOTALLING 141 m, SURFACE STRIPPING.
							1963-75	RESTAKED AND PROS BY W. GUPPY.
							1976-78	STRIPPING, TREN, SCUT.
							1986	OPTIONED BY TAMARA RESOURCES.

TABLE D
DEPOSITS/PROSPECTS OF UNCERTAIN POTENTIAL

INV. #	NAME	LOCATION				DEPOSIT TYPE	EXPLORATION HISTORY	
		LATITUDE		LONGITUDE			DATE	ACTIVITY
		°	'	°	'			
15	HERBERT INLET	49	25	125	52.3	VEIN	1933	STAKED
							1934-35	ABCO MINES FORMED TO WORK MARY McQUILTON PROPERTY AS IT WAS CALLED THEN. ROAD AND AERIAL TRAMWAY BUILT. DEVELOPMENT WORK.
							1935, 1937, 1938	PRODUCTION - 80 T 7.2 Kg Au, 3.2 Kg Ag, 265 KG Cu.
							1936	METALLURGICAL STUDY BY H. WARREN & J.M. CUMMINGS.
							1944	RESTAKED BY BERTON GOLD MINES
							PRE-1959	DEVELOPMENT INCLUDED 672 m DRIFT.
							1959-62	DEVELOPMENT AND EXPLORATION WORK, CAMP ACCOMMODATION, TRAMWAY AND DOCK INSTALLED. THREE SHIPMENTS OF ORE TOTALLING 43.5 T HAD AN AVERAGE GRADE OF 112.38 g Au/T.
							1986	REVERTED CROWN GRANT OWNER OPTIONED PROPERTY TO CONSORT ENERGY.
22	KING MIDAS	49	40.1	124	00.1	REPL/ VEIN		NOT REVIEWED EXCEPT SOME PRODUCTION FROM CAMBRIAN CHIEFTAN. 1937, 49, 50, 53, 61 INDICATED TO BE FROM KING MIDAS.
23	CAMBRIAN CHIEFTAN	49	40.9	123	56.3	REPL	1949, 1952, 1961, 1963	PRODUCTION (NOTE SOME ORE FROM NEARBY KING MIDAS PROPERTY, SEE ABOVE). - 1421 T 529 g Au, 12.5 Kg Ag, 74,946 Kg Cu
26	MARJORIE, BOLIVAR	49	45.4	124	35.1	VEIN & DISS	1980	DISCOVERY OF QUARTZ VEINS WITH FREE GOLD ON TEXADA ISLAND.
							EARLY 1900'S	EXPLORATION, SOME DEVELOPMENT, PRODUCTION.
							1903, 1916, 1921, 1938	PRODUCTION - 206 T 1.2 Kg Au, 3.0 Kg Ag, 1,709 Kg Cu.
							1922	AMALGAMATION/ROSS MILL INSTALLED ON MARJORIE.
							1939	SECONDEE MINES DEWATERED WORKINGS, ORE STRIPPED FROM AN INCLINED DRIFT.
							1974-75	LONGBAR MINERALS CARRIED OUT GEOP AND DD TOTALLING 11 HOLES, 466 m.
							1978	GEOP, GEOC, GEOL, TREN AND LEGAL SURVEY. DD TOTALLING 2 HOLES, 117.5 m, ACCESS ROAD IMPROVEMENTS.
							1983	OPTIONED TO TERRITON RESOURCES.
							1985	HERITAGE PETROLEUM CARRIED OUT GEOP, GEOC, TREN AND DD - 12 HOLES. SMALL TEST MILL INSTALLED ON BOLIVAR CLAIM, PROCESSING MATERIAL FROM BOLIVAR AND HOLLY.

TABLE D
DEPOSITS/PROSPECTS OF UNCERTAIN POTENTIAL

DWG. #	NAME	LOCATION				DEPOSIT TYPE	EXPLORATION HISTORY	
		LATITUDE		LONGITUDE			DATE	ACTIVITY
		°	'	°	'			
27	MOUNT WASHINGTON GOLD	49	45.5	125	15	VEIN & FRACT	1980'S	DISCOVERED AND STAKED.
							1983	GEOC (SOIL) OUTLINED LARGE ARSENIC ANOMALY. TREN OF GEOCHEMICAL ANOMALY EXPOSED NEW OCCURRENCE OF GOLD-BEARING SULPHIDE VEINS. CHANNEL SAMPLING RESULTS 7.88 g Au/T OVER 1.9 m, 39.67 g Au/T OVER 1.7 m. TREN OF PREVIOUSLY KNOWN BASE METALS OCCURRENCES CONFIRMED PRECIOUS METALS CONTENT, SDD - 2 HOLES.
							1984	SDD TOTALLING 16 HOLES, 435.9 m TESTED GEOCHEMICAL ANOMALY. THREE ZONES PRESENTLY KNOWN - DOMINEER, WEST AND LAKEVIEW.
29	SHOOKUM (CHALICE)	49	45.8	123	59	FRACT/ SHEAR	1952	GOLD SHOWING DISCOVERED.
							1952-66	SURFACE EXPLORATION
							1966	SCUT BY ABACON MINERAL EXPLORATION. PRODUCTION - 96.2 T RETURNED AVERAGE GRADE OF 10.97 g Au/T, 14.4 g Ag/T, 0.08% Cu.
							1969	SCUT BY BART MINES.
							1970	GEOP
							1982	STAKED BY CHALICE MINING. GEOL, SAMP OF SHOWINGS. NEW VEIN DISCOVERED.
							1983-84	PROS, GEOC, GEOP, TREN, SDD
							1985	SDD, TREN. SOME METALLURGICAL ELECTROPROBE ANALYSES INDICATE GOLD PRESENT IN PYRITE AND TELLURIDES.
30	FORT ELIZA GOLD MINE	49	53	127	01.4	VEIN	1940	PRODUCTION - 13 T 435 g Au, 2g Ag, 22 Kg Cu
32	ICE, YALAKUM	49	58.5	123	26.5	VEIN	1920'S	GOLD-SILVER-COPPER SHOWINGS LOCATED AND STAKED. SURFACE AND UG EXPLORATION WAS DONE. 1.8 T OF HAND SORTED ORE WAS SHIPPED AND HAD AN AVERAGE GRADE OF GREATER THAN 17.1 g Au/T.
							1977	RESTAKED BY E. HANSEN, ACQUIRED BY F. MARHARD OF WEST-MAR RESOURCES.
							1979	GEOL, SAMP OF SHOWINGS AND ADIT.
							1983	SDD - TOTALLING 15 SHALLOW DEPTH HOLES.

TABLE D
DEPOSITS/PROSPECTS OF UNCERTAIN POTENTIAL

INV. #	NAME	LOCATION				DEPOSIT TYPE	EXPLORATION HISTORY	
		LATITUDE		LONGITUDE			DATE	ACTIVITY
		°	'	°	'			
33	BEANO	49	59.8	126	48.7	VEIN/ REPL	1936, 1937	STAKED BY A. STEWART, A. TROUT
							1938	OPTIONED BY A. FREAKE AND ASSOC.
							1938-39	TRAIL BUILT, SURFACE STRIPPING ON UPPER SHOWINGS AND CANYON SHOWINGS. SCUT.
							1939	OPTIONED BY VICTORY MINING SYNDICATE.
							1943-47	ROAD BUILT TO PROPERTY FROM TIDEWATER, 900 m AERIAL TRAMWAY CONSTRUCTED. TWO SCUT AND 2 ADITS EXCAVATED ON CANYON SHOWINGS. UPPER SHOWINGS WORKED BY 4 SCUT.
							1948	ONE ADIT WAS EXCAVATED ON UPPER SHOWINGS.
							1948-49	PRODUCTION - 21 T 3.3 Kg Au, 1.4 Kg Ag, 33 Kg Cu.
[illegible]	TAGORE	50	00.3	126	50.8	VEIN	1924	DISCOVERED AND STAKED. FIRST GOLD VEIN DISCOVERY IN ZEBALLOS CAMP.
							1925	PROSPECTED, SEVERAL SCUT.
							1929	OPTIONED BY TAGORE.
							1929-32	ADIT, SHALLOW SHAFT AND SCUT.
							1930, 1932, 1939	PRODUCTION - 14 T 1.2 Kg Au, 2.0 Kg Ag, 23 Kg Cu, 20 Kg Pb.
							1937-38	STRIPPING AND SCUT, XCUT DRIVEN FROM ADIT.
							1940	SHAFT TO 45.7 m DEPTH.
							1946-47	REHABILITATION OF CAMP. 70 FT. AND 140 FT. LEVELS REOPENED. TOTAL OF 41 m DRIFT, XCUT ON 140 FT. LEVEL.
35	FIL MIL	50	00.6	127	06.1	VEIN	1938	DISCOVERED, CLAIMS LOCATED.
							1938-40	SURFACE EXPLORATION BY J. PUGH AND ASSOC.
							1941	NARROW QUARTZ VEIN OUTLINED, SURFACE AND UG WORK INCLUDING DEVELOPMENT ON 3 LEVELS. FIVE NARROW ORE ZONES OUTLINED.
							1946	DEVELOPMENT IN 3 ADITS TOTALLED 198 m DRIFT.
							1947	15 TPD MILL INSTALLED. TRAM LINE CONSTRUCTED.
							1977-79	ACQUIRED BY D. MURPHY, EXPLORATION.
							1980-82	RED MOUNTAIN RESOURCES EXPLORED PROPERTY.
							1981	DYKES WHICH PARALLEL THE VEIN STRUCTURES WERE FOUND TO HOST SIGNIFICANT GOLD MINERALIZATION.
							1985	ACQUIRED BY CAL-DENVER RESOURCES. SAMP, GEOL ON SHOWINGS AND WORKINGS. RECONNAISSANCE GEOL AND GEOC (SOIL) INDICATE PARALLEL ZONES ARE PRESENT IN HANGING WALL OF WORKINGS.

TABLE D
DEPOSITS/PROSPECTS OF UNCERTAIN POTENTIAL

		LOCATION				DEPOSIT	EXPLORATION HISTORY	
INV. #	NAME	LATITUDE °	'	LONGITUDE °	'	TYPE	DATE	ACTIVITY
39	ZEBALLOS PACIFIC	50	01.2	126	48.2	VEIN/ SHEAR	1933, 1937	STAKED
							1934-35	CLAIMS CROWN GRANTED. SURFACE WORK INCLUDED STRIPPING AND 2 SCUT.
							1934	PRODUCTION - 3 T 93 g Au, 746 g Ag.
							1937	ZEBALLOS GOLD PEAK CO. DROVE 2 ADITS (#3 AND #4 ADITS).
							1940	ZEBALLOS PACIFIC ACQUIRED THE PROPERTY. TUNNELLING IN #3 ADIT. 3 ADITS (#1, 0 AND 00) WERE BEGUN. TOTAL PRODUCTION (ACCORDING TO SINCLAIR AND HANSEN 1982) 393 T 11.0 Kg Au.
43	RIMY	50	01.6	126	47	VEIN	1934, 35	STAKED
							1935-38	ACQUIRED BY MAN-OF-WAR MINES. DEVELOPMENT IN 3 ADITS ON 2 VEINS. A TOTAL OF 783.6 m TUNNELLING, PRIMARILY IN ADIT #3 AND ADIT #4 ON MAIN VEIN.
							1938	PRODUCTION - 17 T 1.4 Kg Au, 1.6 Kg Ag.
46	KING MIDAS	50	03.7	126	47.6	VEIN	1926	STAKED
							1926-28	SURFACE EXPLORATION ON QUARTZ VEINS AND LARGE LOW-GRADE BODIES OF DISSEMINATED SULPHIDES BY MARKS GOLD AND COPPER MINES.
							1932-33	ADIT #1 EXCAVATED. 18 m XCUT DRIVEN TO THE VEIN AND DRIFT.
							1933	KING MIDAS MINING DROVE WINZ FROM ADIT #1. 30.5 m DRIFT DRIVEN SOUTHWARD. #2 ADIT EXCAVATED.
							1934	DRIFT DRIVEN NORTHWARD IN ADIT #1.
							1938	SURFACE EXPLORATION ON SHOWINGS NEAR ZEBALLOS RIVER.
							1940	PRODUCTION - 1 T 156 g Au, 31 g Ag, 10 Kg Cu.
52	THURLOW GOLD	50	24.9	125	20.3	VEIN	1929-41	PRODUCTION - 383 T 3.0 Kg Au, 4.1 Kg Ag, 135 Kg Cu.
54	DOUGLAS PINE	50	27.2	125	21.2	VEIN/ SHEAR	1938-40	PRODUCTION - 340 T 6.7 Kg Au, 10.4 Kg Ag, 1,569 Kg Cu.
							1940	25 TPD MILL ERECTED, AERIAL TRAM CONSTRUCTED. DEVELOPMENT ON 2 LEVELS (SEVERAL 100 FEET OF DRIFT). STOPE.

TABLE D
DEPOSITS/PROSPECTS OF UNCERTAIN POTENTIAL

INV. #	NAME	LOCATION				DEPOSIT TYPE	EXPLORATION HISTORY	
		LATITUDE		LONGITUDE			DATE	ACTIVITY
		°	'	°	'			
60	SILTA	50	59.7	127	12.2	VEIN	1940-41,	PRODUCTION - 609 T 20.9 Kg Au, 44.8 Kg Ag, 1,755 Kg Cu, 10,188 Kg Pb, 234 Kg Zn.
62	HIGH GRADE	52	38.2	131	42.4	DISS	1977-1980	PROPERTY STAKED AND ACQUIRED BY VENTURES WEST MINERALS.
							1983	GEOC (SOIL), GEOL, SDD TOTALLING 30 HOLES, 1,028 m OUTLINED NW TRENDING, GOLD-BEARING ZONE. RESULTS INCLUDED 1.27 g Au/T OVER 1.05 m AND 5.03 g Au/T OVER 0.46 m. TREN TRACED ZONE FOR 2000 m.
							1984	AIRBORNE GEOP (VLF-EM, MAG), GEOL, GEOC.
63	APRIL	52	41	131	41	DISS	1980	GEOC, GEOL, SDD - 5 HOLES 609.8 m
							1981	SDD
							1984	SDD - 4 HOLES 894.7 m.
66	WESTERN COPPER	53	05.9	128	20.3	VEIN	EARLY 1900'S	STAKED BY MELDRUM & McLEOD.
							1909	CLAIMS SURVEYED AND CROWN GRANTED.
							1909-13	STRIPPING, UG DEVELOPMENT (SEVERAL THOUSAND FEET) IN ASSOCIATION WITH MARTIN & SHANNON REAL ESTATE CO. 3.5 KM OF RAILROAD BUILT.
							1927	DETROIT WESTERN MINING CO. GAINED INTEREST. RAILROAD EXTENDED AND RETRACKED. AERIAL TRAMWAY BUILT.
							1928-29	PRODUCTION - 215 T 5.3 Kg Au, 45.2 Kg Ag, 30,812 Kg Cu.
							1931	REVENUE MINING CO. OPTIONED PROPERTY AND DROVE DECLINE.
							1937-38	ALL EQUIPMENT REMOVED.
							1966	KHUTZE MINES FORMED. 6.5 KM ROAD BUILT TO WITHIN 1 Km OF PROPERTY. LOOKED AT BY CALGARY INTERESTS.
68	SOUTH-EASTER	53	16.8	131	59.9	VEIN/ SHEAR	1919-36	PRODUCTION - 459 T 1.3 Kg Au, 840 g Ag, 117 Kg Cu, 302 Kg Pb.
69	OK	53	19.5	128	57.2	SKARN	1900-06	UG DEVELOPMENT.
							1905	UG SAMP ON KEN CLAIM OUTLINED GRADE OF 6.51 g Au/T, 24.0 g Ag/T, 1.79% Cu.
							1906	PRODUCTION - 35 T 31 g Au, 1.3 Kg Ag, 372 Kg Cu.
							1970	SAMP
							1971-72	TREN

TABLE D
DEPOSITS/PROSPECTS OF UNCERTAIN POTENTIAL

INV. #	NAME	LOCATION				DEPOSIT TYPE	EXPLORATION HISTORY	
		LATITUDE		LONGITUDE			DATE	ACTIVITY
		°	'	°	'			
71	SMITH-WASH	53	29.2	127	48.2	VEIN	1952	DISCOVERED BY SURVEYORS ON KEMANO DAM ROAD.
							1952-53	SAMP
							1960	OPTIONED BY SILVER STANDARD MINES, SURFACE EXPLORATION.
							1981	SAMP, PROS
73	DRUM-LUMMON	53	46.2	129	0.5	DISS	1907-30	INTERMITTENT WORK INCLUDING 1009 m OF UG DEVELOPMENT, 2 ADITS.
							1917	FIRST ADIT DRIVEN.
							1918-21,	PRODUCTION - 938 T
							1926	1.8 Kg Au, 49.0 Kg Ag, 33,423 Kg Cu.
							1923	TRACK LAID, AERIAL TRAMWAY BUILT, WINZ, RSE.
							1929	STOPING ABOVE AND BELOW TUNNEL, ABOUT 910 T MINED.
75	INCON-SPICUOUS	54	00	133	00	VEIN	1977	PROPERTY STAKED, ACQUIRED BY VENTURES WEST MINERALS.
							1980	ACQUIRED BY MAJOREM MINERALS.
							1980-83	PROS, GEOC.
							1983	OPTIONED TO HOMESTAKE. GEOC, GEOP (MAG, I.P.) SDD - TOTALLING 5 HOLES, 539 m.
77	JITNEY	54	03.7	130	25	VEIN/ REPL.	1917	PRODUCTION - 4 T 62 g Au, 2.5 Kg Ag, 1,600 Kg Cu
							1973	GEOL., GEOP, PITS, 13 DD HOLES.
80	MAPLE BAY GROUP	55	25.2	129	59.9	VEIN/ REPL.	1902	DISCOVERY
							1904	DEVELOPMENT WORK
							1906-69	INTERMITTENT WORK INCLUDING TREN, DRIFT, DD.
							1923	DD AND TESTING ON EAGLE VEIN BY GRANBY MINING, SMELTING AND POWER.
							1924	RESERVES 473,558 T 1.71% Cu IN MAPLE BAY - EAGLE VEIN.
							1955-56	DD
							1969	HELD BY GREAT SLAVE MINES BY OPTION FROM MAPLE BAY COPPER MINES. DRIFT AND TESTING PRINCESS VEIN ON 2400 FT. LEVEL.
							1970	XCUT TO ANACONDA AND PRINCESS VEINS FROM 572 m. ELEV., BY G.S. MINES.
83	ESPERANZA	55	29.6	129	29.4		1911-48	PRODUCTION - 8.0 Kg Au, 4,450.9 Kg Ag, 1,192 Kg Cu, 6,047 Kg Pb.

TABLE D
DEPOSITS/PROSPECTS OF UNCERTAIN POTENTIAL

INV. #	NAME	LOCATION				DEPOSIT TYPE	EXPLORATION HISTORY	
		LATITUDE		LONGITUDE			DATE	ACTIVITY
		°	'	°	'			
89	WOODBINE	56	03.4	130	02.0	DISS	1920-36	INTERMITTENT WORK INCLUDING DD, TREN, UG DEVELOPMENT ON MAIN ZONE.
							1929	PRODUCTION - 5 T 249 g Au, 2.5 Kg Ag
							1979	EXPLORATION IN CONJUNCTION WITH PREMIER EXTENSION PROPERTY.
							1983	DD 3 HOLES BY ESSO MINERALS IN CONJUNCTION WITH INDIAN PROPERTY.
97	TROY	56	11.6	130	03.4	VEIN/ REPL	1978, 79	PRODUCTION - 875 g Au, 21.6 Kg Ag, 1,290 Kg Pb, 3,626 Kg Zn.
100	EAST GOLD	56	16.6	130	04.1	VEIN/ SHEAR	1949-50, 1952-54, 1965	PRODUCTION - 31 T 31.7 Kg Au, 98.6 Kg Ag, 30 Kg Cu, 2,354 Kg Pb, 1,029 Kg Zn.

3.0 ACKNOWLEDGEMENTS

The work has benefited from the assistance of N. Jorgensen in the preparation of tables and data sheets and the coordination of the drafting of maps.

T. Henneberry (McAdam Resources), T. Clark (Imperial Metals Corporation), and M. Meldrum provided maps and additional information for the case histories.

APPENDIX A

PROPERTY NAME: Fandora
LOCATION: Latitude 49°18.4'
Longitude 125°41.2'
NTS #: 92F 4E

INDEX MAP #: 10
CATEGORY: A
MAP REFERENCE: FIGURE I-L3

ACCESS

By water; up Bedwell Sound, approximately 20 km northeast of Tofino. Property is located approximately 2.5 km from tidewater. A local access road is present.

ENVIRONMENTAL DATA

1) Physiographic

Elevation	Topography	Prominent Soil Type
833 m	steep, rugged	Ferro Humic Podzol

2) Climatic (average/quarter)

Station Name: Tofino Airport
Lat/Long: 49°05' 125°46'

	1st	2nd	3rd	4th
Temperature (°C)	5.2	10.0	14.0	7.4
Precipitation (mm)	1048.8	451.9	312.7	1247.8
Snowfall (cm)	27.5	1.5	0.0	12.7

Frost-free days - 203

3) Hydrometric (average/quarter)

Station No.: 08HC003 Sharp Creek
Lat/Long: 49°10.8' 125°51.9'

Streamflow (m^3/sec)	N/D	0.11	0.10	N/D

Station No.: 08HB0C4 Mercantile Creek
Lat/Long: 48°57.5' 125°31.4'

Streamflow (m^3/sec) - May-July 0.76; Aug-Oct 0.81

DEPOSIT DATA

Geology: Gold and silver bearing quartz veins are present in shear zones in altered tuff and breccia. Nearby, the country rocks have been intruded by andesite dykes. The deposits consist of four main veins which are comprised of banded quartz and minor carbonate, and chalcopyrite, pyrite, galena and sphalerite with associated gold and silver values.

PROPERTY NAME: Fandora INDEX MAP #: 10
LOCATION: Latitude 49°18.4' CATEGORY: A
Longitude 125°41.2' MAP REFERENCE: FIGURE I-L3
NTS #: 92F 4E

DEPOSIT DATA

Mineralogy: Chalcopyrite, pyrite, galena, sphalerite.

Reserves: (Probable) 38,100 T at 15.08 g Au/T (uncut), 13.71 g Au/T (cut); (Potential) 181,437 T at 10.28 g Au/T (VSE/SMF, Devon Industries 1983).

Metallurgy: Not reviewed.

Production: 1940, 1960-1964 1,017 T - 46.5 Kg Au; 8.4 Kg Ag; 9 Kg Cu; 82 Kg Pb; 36 Kg Zn.

EXPLORATION HISTORY

Date	Activity
late 1930's	Discovered, several adits excavated.
1940	UG development in 2 DRIFT. Small production - 45 T yielding 809 g Au.
1946	Optioned by PRIVATEER MINES. UG development on 3 levels at Fandora, 1 ADIT at Goldflake mine.
1947	TOFINO GOLD MINES formed. UG development and 26 SCUT.
1949	Taken over by CAMAC MINING CO., camp rehabilitation, UG and surface exploration and construction was done.
1957-1958	MONETA MINES held the property. 288 m drifting was done.
1960-1964	UG development, production.
1963-1964	Operations taken over by NEW HAMILL SILVER-LEAD MINES. Mining and milling was done. Mine shut down (1964).
1983-1984	Road construction, rehabilitation and sampling of some workings undertaken by DEVON INDUSTRIES. Ore reserve estimation was made.
1985	Joint venture by DEVON and GOLD CANYON RESOURCES terminated, property now held by NEW PRIVATEER MINES LTD.

PROPERTY NAME: Spud Valley INDEX MAP #: 37
LOCATION: Latitude 50°08.0' CATEGORY: A
Longitude 126°48.6' MAP REFERENCE: FIGURE I-L8
NTS #: 92L 2W I-Ala, b, c, d

ACCESS

By road; 10 km from Zeballos. Zeballos is located at the head of Zeballos Inlet on the coast of Vancouver Island.

ENVIRONMENTAL DATA

1) Physiographic

Elevation	Topography	Prominent Soil Type
290 m	steep, rugged	Ferro Humic Podzol

2) Climatic (average/quarter)

Station Name: Tahsis
Lat/Long: 49°55' 126°39'

	1st	2nd	3rd	4th
Temperature (°C)	2.6	11.3	16.3	5.1
Precipitation (mm)	1220.8	516.4	475.4	1616.2
Snowfall (cm)	47.1	2.3	0.0	19.6

Frost-free days - 163

3) Hydrometric (average/quarter)

Station No.: 08HE006 Zeballos River
Lat/Long: 50°09' 126°50.6'

Streamflow (m³/sec)	30.9	21.1	15.3	41.8

DEPOSIT DATA

Geology:	Quartz veins and stringers containing pyrite, arsenopyrite, sphalerite and galena with gold values (and some native gold) and chlorite are present in shear zones in quartz diorite. The veins are displaced by shears. Intersecting veins and splay veins seem to be related to location of ore shoots.
Mineralogy:	Sphalerite, galena, pyrite, arsenopyrite, native gold.

PROPERTY NAME: Spud Valley INDEX MAP #: 37
LOCATION: Latitude 50°08.0' CATEGORY: A
Longitude 126°48.6' MAP REFERENCE: FIGURE I-L8
NTS #: 92L 2W I-Ala, b, c, d

DEPOSIT DATA

Reserves: 49,895 T at 4.66 g Au/T (MRI 80/7).

Metallurgy: Reviewed report by Witteck Development Inc. (1986), Exploratory Metallurgical Test work on Spud Valley Gold Ore for McAdam Resources.

Production: (Spud Valley and Big Star Mines) 1936, 1938-1942, 1951 190,532 T - 1,682.9 Kg Au; 560.4 Kg Ag; 18,000 Kg Cu; 16,000 Kg Pb.

EXPLORATION HISTORY

Date	Activity
1935	Goldfield vein was discovered. Property was staked. 2 SCUT. 10 tpd mill installed on Goldfield claim.
1936	3 ADIT.
1937	Property acquired by SPUD VALLEY MINES. UG development continued.
1938	Full scale mining and milling (125 tpd) began.
1939	5 tunnels (#2 to #5) on Goldfield Vein operated. Roper vein tunnel also operated. Some work on the Spur Vein (which intersects the Goldfield Vein) was done. STOPE from #1 to #4 levels. 60 to 70 tpd amalgamation/floatation mill operated.
1940	6 tunnels (#2 to #7) operated. STOPE on all levels on Goldfield Vein and on Spur Vein on #4 level. DRIFT on Spur Vein on #3 level. Total production 1,413.7 m - DRIFT, XCUT, RSE.
1942	Mine closed.
1946	New low-level ADIT driven below #7 level. Total work - 152 m DRIFT.
1947	New adit was extended 45.7 m.
1951	23 T of ore produced from "clean up" of workings.
1983-1984	Property examined and acquired by McADAM RESOURCES.
1985-1986	Rehabilitation of workings. UDD - 3 holes and SDD - 6 holes by McADAM tested known veins. A "new" vein was intersected in 2 holes: Intersections include S85-6 83.61 g/T Au over 1 m; S85-3 9.19 g/T Au over 1.1 m. Preliminary metallurgical testing done.

PROPERTY NAME: Privateer
INDEX MAP #: 44
LOCATION: Latitude 50°01.7'
Longitude 126°46.7'
CATEGORY: A
MAP REFERENCE: FIGURE I-L8
NTS #: 92L 2W

ACCESS

By road; 7 km from Zeballos.

ENVIRONMENTAL DATA

1) Physiographic

Elevation	Topography	Prominent Soil Type
733 m	steep, rugged	Ferro Humic Podzol

2) Climatic (average/quarter)

Station Name: Tahsis
Lat/Long: 49°55' 126°39'
Temp. data: Gold River
Townsite 49°47' 126°3'

	1st	2nd	3rd	4th
Temperature (°C)	2.6	11.3	16.3	5.1
Precipitation (mm)	1220.8	516.4	475.4	1616.2
Snowfall (cm)	47.1	2.3	0.0	19.6

Frost-free days - 163

3) Hydrometric (average/quarter)

Station No.: 08HE006 Zeballos River
Lat/Long: 50°09' 126°50.6'

	1st	2nd	3rd	4th
Streamflow (m^3/sec)	30.9	21.1	15.3	41.8

DEPOSIT DATA

Geology:	Quartz veins containing sphalerite, galena, chalcopyrite, arsenopyrite, pyrite, pyrrhotite and native gold transect Bonanza Group volcanic and lime silicate sedimentary rocks and Jurassic quartz diorite. The principal veins are parallel to the axial plane of a trough in the Bonanza rocks at a sharp bend in the contact with a quartz diorite intrusion. Quartz and sulphides occur in alternating bands in the veins.
Mineralogy:	Sphalerite, galena, chalcopyrite, arsenopyrite, pyrite, pyrrhotite, native gold.

PROPERTY NAME: Privateer INDEX MAP #: 44
LOCATION: Latitude 50°01.7' CATEGORY: A
Longitude 126°46.7' MAP REFERENCE: FIGURE I-L8
NTS #: 92L 2W

DEPOSIT DATA

Reserves: 113,400 T at 8.23 g Au/T (MRI 80/7).

Metallurgy: Reviewed reports MacDonnell, G.F. (1938) "The Privateer Mine, Zeballos" and Warren, H.V. et.al. (1940) "Variations in the Distribution of Tailings Losses in Some B.C. Mines".

Production: (Privateer and Prident Mine) 1934-1953, 1975 282,328 T - 5,301.3 Kg Au; 2,160.2 Kg Ag; 4,063 Kg Cu; 10,093 Kg Pb.

EXPLORATION HISTORY

Date	Activity
1936	Privateer No. 1 vein was discovered.
1936-1937	Surface excavations included stripping, SCUT. Several tons of high grade ore was shipped. UG work began in 2 ADIT - 900 and 1000 levels.
1938	90 tpd amalgamation/floatation mill was installed. Report on Privateer Mine metallurgy, etc. was done by MacDonnell. Work was conducted on several levels (above 1100 level). A XCUT to No. 2 vein was excavated.
1938-1948	Total development - 7,226.7 m (not including STOPE), Total DD - 5,434.2 m.
1939	XCUT to No. 2 vein made on 800 and 900 levels. DRIFT on No. 2 vein. STOPE between 600 and 1100 levels. SHAFT from 1100 level (No. 1 vein) was sunk 39 m.
1940	STOPE on No. 2 vein began. SHAFT completed to 1200 level.
1941	No. 2 vein STOPE on all levels (600 to 1200). No. 3 and No. 4 veins evaluated on upper levels. SHAFT completed to 1300 level. XCUT to Prident Mine was started.
1942	STOPE on No. 1,2,3 veins. XCUT completed to Prident. 12 veins encountered in XCUT (2 of the veins are in Prident Mine).
1943	UG development in Privateer and Prident. STOPE on 900, 1000 levels in Privateer.
1946	Rehabilitation and development in both mines.
1947, 1948	UG development, primarily in Privateer Mine. ADIT on veins outside the mine were also done.
1961	A program of UDD included 7 holes, totalling 361.5 m.
1984-1985	UG development and exploration included DRIFT. New high grade ore shoot discovered.

PROPERTY NAME: Surf Inlet INDEX MAP #: 65
LOCATION: Latitude 58°05.0' CATEGORY: A
Longitude 128°52.8' MAP REFERENCE: FIGURE I-L12
NTS #: 103H 2W I-A2a, b, c

ACCESS

By water; to the head of Surf Inlet on Princess Royal Island. Mine site is approximately 12 km by trail (or formerly by railroad) from tidewater.

ENVIRONMENTAL DATA

1) Physiographic

Elevation	Topography	Prominent Soil Type
50-60 m (main portals)	moderately rugged	Ferro Humic Podzol

2) Climatic (average/quarter)

Station Name: Prince Rupert
Lat/Long: 54°17' 130°23'

	1st	2nd	3rd	4th
Temperature (°C)	2.7	9.2	13.2	5.6
Precipitation (mm)	603.2	413.8	509.8	887.7
Snowfall (cm)	72.7	3.3	0.0	37.2

Frost-free days - 191

3) Hydrometric (average/quarter)

Station No.: 08FE001 Kemano River
Lat/Long: 53°30' 128°05'

Streamflow (m^3/sec)	13.2	119.5	120.7	50.0

Station No.: 08FF002 Hirsch Creek
Lat/Long: 54°03.8' 128°36'

Streamflow (m^3/sec)	6.69	31.03	26.0	21.5

DEPOSIT DATA

Geology: Quartz veins with gold, pyrite and chalcopyrite mineralization are present in a shear zone in diorite and gneiss. The shear zone trends northerly and has been traced for over 4,500 m along strike and 900 m in vertical depth.

PROPERTY NAME: Surf Inlet INDEX MAP #: 65
LOCATION: Latitude 58°05.0' CATEGORY: A
Longitude 128°52.8' MAP REFERENCE: FIGURE I-L12
NTS #: 103H 2W I-A2a, b, c

DEPOSIT DATA

Mineralogy:	Pyrite, chalcopyrite, native gold, molybdenite.
Reserves:	42,865 T at 13.71 g Au/T (Honsberger, 1973).
Metallurgy:	Reviewed reports by Warren, H.V. (1936), Mineralogy of Hunter and Surf Inlet Ores, and Hawthorn, G. (1986), Extraction of Gold from Mill Tailings and Mine Waste, Preliminary Testing.
Production:	1902-1943 907,185 T - 11,819.1 Kg Au; 6,220.6 Kg Ag; 2,724,000 Kg Cu.

EXPLORATION HISTORY

Date	Activity
1900-1902	Original staked as the D.L.S. Group. Exploration work was done. Trial shipments of ore had an average grade of 171.4 g Au/T, 3% Cu.
1912-1914	Development work in 2 tunnels by BELMONT SURF INLET MINES.
1912-1917	Over 3950 m of DRIFT.
1917-1925	Full production, primarily from Surf Inlet Mine, some work on Pugsley.
1933	PRINCESS ROYAL GOLD MINES incorporated. Some ore extracted for shipment.
1934	Inclined shaft dewatered. Development (DRIFT, XCUT) on 1000 level of Pugsley Mine.
1935	Surf Inlet Mine under development.
1936-1939	Development and production in Pugsley Mine from 700 to 1000 levels. Development in Surf Inlet Mine on 900 level. Upper levels (above 900) resampled and explored.
1940-1941	Total development at Surf and Pugsley Mines - 2,700 m - DRIFT, RSE and XCUT. 12,800 m DD completed. Work was done primarily on 900, 1100 levels of Pugsley, 200, 500, 935 levels of Surf.
1942	Total development at Surf and Pugsley Mines - 1,142 m included DRIFT, RSE. DD at Surf and Pugsley.
1946	UG development.
1973	Ore reserve estimation by Honsberger for MATACHEWAN CONSOLIDATED MINES.
1981	Optioned to COMINCO and PLACER. SDD completed.
1985	Optioned by FLEET DEVELOPMENTS. Engineering studies began.

PROPERTY NAME: Hunter
LOCATION: Latitude 53°12.6'
Longitude 128°22.4'
NTS #: 103H 1W

INDEX MAP #: 67
CATEGORY: A
MAP REFERENCE: FIGURE I-L12
I-A3a, b, c, d, e

ACCESS

By trail; along the east side of the north branch of the Khutze River, 22 km from the head of Khutze Inlet.

ENVIRONMENTAL DATA

1) Physiographic

Elevation	Topography	Prominent Soil Type
290 m	steep, rugged	Ferro Humic Podzol

2) Climatic (average/quarter)

Station Name: Bella Coola
Lat/Long: 53°12.6' 128°22.4'

	1st	2nd	3rd	4th
Temperature (°C)	0.7	11.1	15.0	3.1
Precipitation (mm)	436.2	185.4	249.4	659.3
Snowfall (cm)	97.5	2.3	0.0	73.2

Frost-free days - 161

3) Hydrometric (average/quarter)

Station No.: 08FE001 Kemano River
Lat/Long: 53°30' 128°05'

Streamflow (m^3/sec)	13.2	119.5	120.7	50.0

Station No.: 08FF002 Hirsch Creek
Lat/Long: 54°03.8' 128°36'

Streamflow (m^3/sec)	6.69	31.03	26.0	21.5

DEPOSIT DATA

Geology: The deposit comprises 0.06-46 cm wide discontinuous quartz veins in a roof pendant of biotite granitoid gneiss in Coast Range granitic rocks. Aplite and pegmatite dykes are common and in some cases enclose quartz veins. The veins contain pyrite, chalcopyrite, gold bearing tellurides and native gold.

PROPERTY NAME: Hunter
LOCATION: Latitude 53°12.6'
Longitude 128°22.4'
NTS #: 103H 1W

INDEX MAP #: 67
CATEGORY: A
MAP REFERENCE: FIGURE I-L12
I-A3a, b, c, d, e

DEPOSIT DATA

Mineralogy:	Pyrite, chalcopyrite, sylvanite (or closely related telluride), native gold.
Reserves:	94,382 T at 12 g Au/T (Parrish, 1980).
Metallurgy:	Reviewed report by Warren, H.V. and Cummings, J.M. (1936a), Mineralogy of Surf Point and Hunter Veins.
Production:	1933 2.7 T - 933 g Au; 373 g Ag.

EXPLORATION HISTORY

Date	Activity
1927	Hunter prospect staked.
1929-1930	Trail and cable car access to property constructed.
1932-1936	Assessment work done by M. MELDRUM.
1933	Production 2.7 T - 933 g Au; 373 g Ag. Shipped from pits on River Vein.
1937	Tunnel driven 42 m on Main Vein by SHEEP CREEK MINES.
1939	Open cuts excavated by J. HAMEL.
1940	Examined by geologist DOLMAGE for R.P. BAKER. Optioned to P. RACEY who supervised excavation of a 46 m shaft and 2-15.2 m drifts on River Vein.
1948	Legal survey conducted, claims crown granted.
1963	Evaluated by Geologist, FAWLEY, for GEORGE BLACK.
1980	Evaluated by I.S. PARRISH. River Vein workings dewatered and rehabilitated, SAMP, GEOL in drifts. Trenches rehabilitated and geologically mapped.
1983	Optioned by ARNHEM RESOURCES who carried out GEOL, GEOC, at surface and UG GEOL, SAMP of River Vein.
1984	731 m DD in 7 holes to test River Vein, vein found to splay at depth. Two holes cut No. 2 vein.
1985	Property returned to owner - M. MELDRUM.

PROPERTY NAME: Yellow Giant INDEX MAP #: 70
LOCATION: Latitude $53^{\circ}21.8'$ CATEGORY: A
Longitude $130^{\circ}7.5'$ MAP REFERENCE: FIGURE I-L13
NTS #: 103H 8E I-A4a, b, c, d, e, f, g, h

ACCESS

By water; to Survey Bay on Banks Island, approximately 120 km south to southwest of Prince Rupert.

ENVIRONMENTAL DATA

1) Physiographic

Elevation	Topography	Prominent Soil Type
30 m	moderate	Fibrisol, Mesisol, Humisol

2) Climatic (average/quarter)
Station Name: Prince Rupert
Lat/Long: $54^{\circ}17'$ $130^{\circ}23'$

	1st	2nd	3rd	4th
Temperature ($^{\circ}$C)	2.7	9.2	13.2	5.6
Precipitation (mm)	603.2	413.8	509.8	887.7
Snowfall (cm)	72.7	3.3	0.0	37.2

Frost-free days - 191

3) Hydrometric (average/quarter)
Station No.: 08EG016 Kloiya River
Lat/Long: $54^{\circ}14.9'$ $130^{\circ}10.3'$

	1st	2nd	3rd	4th
Streamflow (m^3/sec)	5.13	5.66	4.34	9.28

Station No.: 08EG015 Diana Creek
Lat/Long: $54^{\circ}13.8'$ $130^{\circ}9.7'$

	1st	2nd	3rd	4th
Streamflow (m^3/sec)	3.71	4.05	3.24	4.74

DEPOSIT DATA

Geology: The Banks Island occurrences are of two types - disseminated and stockwork deposits in intrusive rocks and high grade veins, replacements and silicified lode deposits in metasedimentary and intrusive rocks. The intrusive rocks consist of granite, quartz monzonite, quartz diorite and diorite of the Coast Plutonic Complex. The metasedimentary rocks predate the Coast rocks and include limestone, quartzite and schist. Well developed local and regional fault and fracture systems have been developed and the mineralization is localized within these structures. Mineralization consists of sulphides accompanied by or containing gold and silver.

PROPERTY NAME: Yellow Giant INDEX MAP #: 70
LOCATION: Latitude 53°21.8' CATEGORY: A
Longitude 130°7.5' MAP REFERENCE: FIGURE I-L13
NTS #: 103H 8E I-A4a, b, c, d, e, f, g, h

DEPOSIT DATA

Mineralogy: Pyrite, pyrrhotite, arsenopyrite, chalcopyrite, sphalerite, galena and molybdenite.

Reserves: Bob: 45,359 T at 40.11 g Au/T
Discovery: 90,719 T at 15.77 g Au/T
Tel: ^{3} 45,350 T at ^{3} 20.57 g Au/T
Kim: a) 997,903 T at 2.47 g Au/T (total deposit)
b) 58,967 T at 11.67 g Au/T (high grade core)
(pers. comm. 1986)

Metallurgy: Reviewed report by Hawthorn, G. (1983), Metallurgical Report for Trader Resource Corp., Yellow Giant Project.

EXPLORATION HISTORY

Date	Activity
1960	Discovery zone found by VENTURES LTD. PROS, 11 short holes by packsack drills were completed. VENTURES LTD. later became part of FALCONBRIDGE NICKEL.
1961-1963	Kim, Bob and several other showings were discovered by FALCONBRIDGE.
1963	Claims staked on west of FALCONBRIDGE property by McINTYRE-PORCUPINE MINES. PROS resulted in discovery of Tel zone. FALCONBRIDGE carried out GEOL, TREN, SDD on their property. SDD on Discovery zone (35 holes, totalling 1,856.8 m) indicated reserves present of 57,153 T at 18.51 g Au/T.
1964	Tel zone was explored by GEOP (SP), GEOL, TREN, packsack drilling by McINTYRE. GEOL, TREN, SDD on Kim zone and GEOP (SP), SDD on Bob zone was carried out by FALCONBRIDGE.
1965	GEOP, SDD, TREN on the Discovery zone. GEOP (SP) on Kim zone.
1975	Claims covering Tel zone were purchased from McINTYRE by SPROAT SILVER.
1976	GEOC, SDD was carried out on several showings by FALCONBRIDGE.

PROPERTY NAME: Yellow Giant INDEX MAP #: 70
LOCATION: Latitude 53°21.8' CATEGORY: A
Longitude 130°7.5' MAP REFERENCE: FIGURE I-L13
NTS #: 103H 8E I-A4a, b, c, d, e, f, g, h

EXPLORATION HISTORY

Date	Activity
1977	SPROAT SILVER consolidated with HECATE GOLD. FALCONBRIDGE holdings were optioned by HECATE GOLD. A 15% decline was excavated on the Bob zone.
1983	All ground was optioned and evaluated by TRADER RESOURCE CORP. Ore reserves on Bob, Kim, Tel and Discovery zones were estimated by INTERNATIONAL GEOSYSTEMS.
1984	Program of systematic exploration including GEOL, GEOC, GEOP and SDD was initiated by TRADER.
1985-1986	SDD program. Ore reserves adjusted.

PROPERTY NAME: Edye Pass
LOCATION: Latitude 54°01.8'
Longitude 130°35.3'
NTS #: 103J 2E

INDEX MAP #: 76
CATEGORY: A
MAP REFERENCE: FIGURE I-L15
I-A5a, b, c, d

ACCESS

By water; to Porcher Island. Main portal is located at tidewater, approximately 35 km southwest of Prince Rupert.

ENVIRONMENTAL DATA

1) Physiographic

Elevation	Topography	Prominent Soil Type
0 m main portal	rugged	Fibrisol, Mesisol, Humisol

2) Climatic (average/quarter)

Station Name: Prince Rupert
Lat/Long: 54°17' 130°23'

	1st	2nd	3rd	4th
Temperature (°C)	2.7	9.2	13.2	5.6
Precipitation (mm)	603.2	413.8	509.8	887.7
Snowfall (cm)	72.7	3.3	0.0	37.2

Frost-free days - 191

3) Hydrometric (average/quarter)

Station No.: 08EG016 Kloiya River
Lat/Long: 54°14.9' 130°10.3'

Streamflow (m^3/sec)	5.13	5.66	4.34	9.28

Station No.: 08EG015 Diana Creek
Lat/Long: 54°13.8' 130°9.7'

Streamflow (m^3/sec)	3.71	4.05	3.24	4.74

DEPOSIT DATA

Geology: Massive pyrite is present in white quartz veins hosted by diorite of the Coast Range Batholith in close proximity to older sedimentary rocks. Ore bodies occur as small irregular lenses. Gold is reportedly very fine grained and occurs with pyrite.

Mineralogy: Pyrite, native gold. Warren and Cummings (1936) report that sylvanite is also present.

PROPERTY NAME: Edye Pass INDEX MAP #: 76
LOCATION: Latitude 54°01.8' CATEGORY: A
Longitude 130°35.3' MAP REFERENCE: FIGURE I-L15
NTS #: 103J 2E I-A5a, b, c, d

DEPOSIT DATA

Reserves: 226,000 T at 8.9 g Au/T (Dearin 1980).

Metallurgy: Reviewed reports by Legg, R.E. (1936), Milling Practice at the Surf Point Mine and Warren, H.V. and Cummings, J.M. (1936a), Mineralogy of Surf Point and Hunter Veins.

Production: (Total former Edye Pass and Surf Point Mines) 1919-1939 61,582 T - 639.9 Kg Au; 2,260 Kg Ag; 4,161 Kg Cu.

EXPLORATION HISTORY

Date	Activity
early 1900's	Properties staked. Originally 2 properties - called Trixie and Edye Pass. Trixie later became known as Surf Point property.
1916-1932	Surface exploration at Surf Point and Edye Pass properties. UG development on Surf Point in 3 adits.
1931-1937	Surf Point prospect evaluated and operated by N.A. TIMMINS CORP. Edye Pass Mine operated by REWARD MINING CO.
1932	25 tpd floatation mill was installed at Surf Point.
1936	Investigation of metallurgy conducted by R.E. Legg (see reference above).
1936-1938	Total development Surf Point Mine - 2,345 m included DRIFT, RSE, XCUT; Edye Pass Mine - 1,472 m included DRIFT, XCUT.
1937	REWARD MINING purchased Surf Point Mine.
1938	PORCHER ISLAND MINES formed to operate both mines. Mill destroyed by fire. 50 tpd mill erected. Limited UG development done in Edye Pass Mine.
1975	Optioned by TOMBILL MINES. A total of 8 UDD holes were drilled on 1015 level (1015 level is former Edye Pass Mine, 1110 level is former Surf Point Mine).
1975, 1977	GEOP, GEOC.
1976	Optioned by CAROLIN MINES who evaluated the possibility of bulk mining.
1978	Optioned by BANWAN GOLD MINES. A total of 4 SDD holes, totalling 1,624 m were drilled on 1015 level.
1979-1980	Extensive UG exploration program was undertaken. Work included UDD totalling 3,469.8 m, DRIFT, RSE on 1015 level. GEOL and SAMP programs were carried out on 1015 and 1110 levels. Ore reserve estimation was done. Extractive testing done.

PROPERTY NAME:	Georgia River River Gold	INDEX MAP #:	85
LOCATION:	Latitude 55°47.3' Longitude 130°03.0'	CATEGORY: MAP REFERENCE:	A FIGURE I-L17
NTS #:	103O 16E		

ACCESS

By trail; from Portland Canal. Trail begins from tidewater approximately 27 km south of Stewart.

ENVIRONMENTAL DATA

1) Physiographic

Elevation	Topography	Prominent Soil Type
1060 m	Rises steeply to 1060 m then gently rolling	Ferro Humic Podzol

2) Climatic (average/quarter)

Station Name: Stewart A
Lat/Long: 55°56' 129°59'

	1st	2nd	3rd	4th
Temperature (°C)	-2.0	9.3	13.2	1.0
Precipitation (mm)	480.4	198.1	342.5	873.8
Snowfall (cm)	319.9	27.4	0.0	291.3

Frost-free days - 127

3) Hydrometric (average/quarter)

Station No.: 08DC006 Bear River
Lat/Long: 56°2.6' 129°55.5'

	1st	2nd	3rd	4th
Streamflow (m^3/sec)	3.0	24.3	54.8	14.9

DEPOSIT DATA

Geology: The property lies on the contact of Coast Range intrusive rocks and Hazelton Group sedimentary and volcanic rocks. These rocks are cut by northwesterly trending shears and northerly trending crossfractures and faults. Three stages of mineralization have occurred. Gold, silver, lead, zinc and minor copper mineralization is associated with the third stage and occurs in northerly trending structures. Gold enriched zones are present where veins intersect.

Mineralogy: Pyrite, pyrrhotite, sphalerite, galena, minor chalcopyrite, arsenopyrite.

PROPERTY NAME: Georgia River Gold
INDEX MAP #: 85
LOCATION: Latitude 55°47.3'
Longitude 130°03.0'
CATEGORY: A
MAP REFERENCE: FIGURE I-L17
NTS # 103O 16E

DEPOSIT DATA

Reserves: 40,823 T at 15.25 g Au/T, 19.54 g Ag/T (pers. comm. 1986).

Metallurgy: Not reviewed.

Production: 1937 454 T - 10.2 Kg Au; 12.8 Kg Ag; 3,314 Kg Pb.

EXPLORATION HISTORY

Date	Activity
1910	Gold bearing structures discovered, Georgia claims staked.
1914-1915	TREN, SCUT on Main Vein.
1915	96 m ADIT and RSE completed to intersect SHAFT on the Bullion Vein.
1915-1918	XCUT, WINZ and ADIT on Bullion Vein, tunnelling on Main Vein.
1928-1931	Pack trail established, UG development included 275 m tunnel from ADIT (No. 3) and extension of Bullion tunnel by 91 m.
1933	HELENA GOLD MINES formed, UG development and DD done.
1935	GOLD LEASERS LTD. leased the property. Some mining was done.
1937	Hadsell mill erected (but crushing and grinding units found to be unsuitable). Some 454 T of ore was produced and backpacked to Portland Canal.
1979	E & B EXPLORATIONS did DD totalling 346.9 m.
1980	GEOL, PROS, TREN. UG exploration included GEOL, SAMP, DD totalling 904.2 m. Results of program included discovery of 11 new veins and numerous mineralized stringers. Ore reserve estimate was done.
1981	DD program included 14 holes totalling 1,105 m. Gold distribution said to be scattered, erratic.
1985	Property held by SAMSON GOLD.

APPENDIX B

PROPERTY NAME: Sunro Mine
INDEX MAP #: 1
LOCATION: Latitude 48°26.5'
Longitude 124°02.1'
CATEGORY: B
MAP REFERENCE: FIGURE I-L1
NTS #: 92C 8E

ACCESS

By road; along the southwestern coast of Vancouver Island, approximately 23 km from Sooke.

DEPOSIT DATA

Geology: The property is underlain by Early Eocene Metochin Basalt which has been intruded by three northwesterly trending sill-like masses of Tertiary Sooke Gabbro. Thirteen ore occurrences are present in shear zones in hornblende-altered basalt near its contact with gabbro. The mineralization consists primarily of chalcopyrite, pyrite and pyrrhotite with associated values of gold and silver.

Mineralogy: Chalcopyrite, pyrite, pyrrhotite, minor molybdenite, cubanite, pentlandite, native copper.

Reserves: 423,829 T at 1.33% Cu (MINFILE 1982)

Metallurgy: Not reviewed.

Production: 1962-1968 1,309,034 T - 899.4 Kg Au; 2,262.7 Kg Ag; 13,754,271 Kg Cu.

EXPLORATION HISTORY

Date	Activity
1915	Discovered.
1917-1921	UG development work in 3 adits, DD.
1948-1950	DD in Sunro Mine, also exploration work done on adjacent Sunloch and Gabbro properties by HEDLEY-MASCOT MINES and CONS. MINING AND SMELTING.
1957	2,255 m tunnel driven, DD.
1961-1968	Development work and production, UG mill was installed and operated intermittently.
1973	UG GEOL, some development done, UDD in 108 holes, totalled 5,800 m.
1974	Development, UDD totalled 2,081.5 m.

PROPERTY NAME: Mount Sicker INDEX MAP #: 3
LOCATION: Latitude 48°51.9' CATEGORY: B
Longitude 123°47.1' MAP REFERENCE: FIGURE I-L1
NTS #: 92B 13W

ACCESS

By road; on Vancouver Island, approximately 23.5 km north of Duncan.

DEPOSIT DATA

Geology: Two parallel sulphide zones are present in a narrow band of folded, cherty tuff and graphitic schist of the Sicker Group near their contact with a rhyolite porphyry unit. The ore bodies occur as small irregular masses along drag folds and have been displaced by easterly trending faults. Mineralization consists of chalcopyrite, sphalerite and minor galena in barite, calcite and quartz gangue interlayered with chalcopyrite, pyrite and sphalerite, and quartz and chalcopyrite replacements of barite ore and schist.

Mineralogy: Chalcopyrite, sphalerite, pyrite, minor galena.

Reserves: No recent reserve figures.

Metallurgy: Not reviewed.

Production: 1898-1909, 1943-1952, 1964 277,899 T - 1,171.5 Kg Au; 10,819.3 Kg Ag; 9,549,594 Kg Cu; 164,587 Kg Pb, 1,926,111 Kg Zn.

EXPLORATION HISTORY

Date	Activity
1898-1907	Development and production by LENORA - MT. SICKER MINING CO. in a total of 5 underground mines which produced at various times.
1898-1907	Lenora, Barite, Twin J mines in production.
1901-1909	Tyee and Twin J mines in production.
1903-1907	Richard III mine in production.
1924-1929	Development and exploration by PACIFIC TIDEWATER MINES, LADYSMITH TIDEWATER SMELTER and others.
1939-1940	DD, UG development by SHEEP CREEK MINES.
1942-1947	Mining and milling at Tyee, Twin J mines by TWIN J MINES.

PROPERTY NAME: Mount Sicker INDEX MAP #: 3
LOCATION: Latitude 48°51.9' CATEGORY: B
Longitude 123°47.1' MAP REFERENCE: FIGURE I-L1
NTS #: 92B 13W

EXPLORATION HISTORY

Date	Activity
1949-1952	Rehabilitation and development, mining of Tyee and Twin J mines by VANCOUVER ISLAND BASE METALS CO.
1964-1967	MOUNT SICKER MINES evaluated possibility of leaching copper from waste dump.
1964	Some production from Lenora, Barite and Twin J mines.
1984	SDD, GEOL, GEOP centered on Twin J mine carried out by CORPORATION FALCONBRIDGE COPPER.

PROPERTY NAME: Thistle
LOCATION: Latitude 49°06.5'
Longitude 124°38.1'
NTS #: 92F 2E

INDEX MAP #: 5
CATEGORY: B
MAP REFERENCE: FIGURE I-L2

ACCESS

By road; 16 km southeast of Port Hardy.

DEPOSIT DATA

Geology:	Two chalcopyrite replacement ore bodies occur in shear zones in altered limestone. The mineralization consists of chalcopyrite and pyrite with associated gold and silver values in a gangue of grey calcite and minor quartz. Magnetite, oxidized to hematite in places, is disseminated in calcite. The shear zones are 400 m apart and extend beyond the known ore limits.
Mineralogy:	Chalcopyrite, pyrite.
Reserves:	No recent reserve figures.
Metallurgy:	Not reviewed.
Production:	1938-1942 6,283 T - 85.9 Kg Au; 66 Kg Ag; 309,088 Kg Cu.

EXPLORATION HISTORY

Date	Activity
1899-1930	Not reviewed.
1938-1942	Production - see summary above.
1983	Optioned from NEXUS by WESTMIN.

PROPERTY NAME: Kallapa INDEX MAP #: 9
LOCATION: Latitude 49°11.7' CATEGORY: B
Longitude 125°51.5' MAP REFERENCE: FIGURE I-L3
NTS #: 92F 4W

ACCESS

By water; on the shore of Meares Island north of Tofino.

DEPOSIT DATA

Geology:	A quartz vein in a shear zone in diabase contains chalcopyrite, pyrite, arsenopyrite and minor sphalerite with associated values in gold and silver.
Mineralogy:	Chalcopyrite, pyrite, arsenopyrite, minor sphalerite.
Reserves:	No present reserves.
Metallurgy:	Not reviewed.
Production:	1913-1914 1,372 T - 17.7 Kg Au; 110.2 Kg Ag; 27,380 Kg Cu.

EXPLORATION HISTORY

Date	Activity
	Not reviewed.

PROPERTY NAME: Danzig
LOCATION: Latitude 49°37.2'
Longitude 126°21.4'
NTS #: 92E 9W

INDEX MAP #: 19
CATEGORY: B
MAP REFERENCE: FIGURE I-L4

ACCESS

By water; 25 km from Yuquot (on the west coast of Vancouver Island) by way of Zuciarte Channel.

DEPOSIT DATA

Geology: Sphalerite and minor chalcopyrite, pyrrhotite and magnetite occur with quartz, calcite and diopside in lenses replacing a limestone bed along its contact with greenstone.

Mineralogy: Sphalerite, chalcopyrite, pyrrhotite, magnetite.

Reserves: * 27,215 T "medium grade Zn" (MRI 80/7).

Metallurgy: Not reviewed.

Production: 1913-1938 130 T -
5.6 Kg Au; 10.2 Kg Ag; 87 Kg Cu.

EXPLORATION HISTORY

Date	Activity
1934	UG development in 1 ADIT.
1934-1938	Development and production.
1948	UG development included DRIFT.
1951-1952	UG development - 103 m DRIFT. UDD totalling 23 holes, 846 m was done by SPUD VALLEY GOLD MINES. Ore reserve estimation done. Reserves as shown above.
1970	Ore reserve estimation indicated a bulk tonnage molybdenum deposit (see below).

* NOTE: Bulk tonnage deposit is also indicated:
16,456,331 T at 0.24% MoS_2 (MINFILE 1982)

PROPERTY NAME: War Eagle (Maggie)
INDEX MAP #: 20
LOCATION: Latitude 49°38.7' Longitude 123°02.2'
CATEGORY: B
MAP REFERENCE: FIGURE I-L7
NTS #: 92G 11E

ACCESS

By road; including highway and logging road along Stawamus River, 43 km from Vancouver.

DEPOSIT DATA

Geology: Pyrite, tetrahedrite and chalcopyrite, with some native gold, occurs in fracture controlled quartz veins which transect rhyolitic flows, and pyroclastic and epiclastic rocks of the Gambier Group. Granitic and quartz dioritic bodies have intruded the country rocks. Massive sulphide mineralization comprised of chalcopyrite, sphalerite, galena and pyrrhotite is also present in a chert horizon of the Gambier sequence.

Mineralogy: Pyrite, tetrahedrite, chalcopyrite, native gold (also massive sulphides, see above).

Reserves: 9,072 T 13.72 g Au/T (estimate, pers. comm. 1986).

Metallurgy: Not reviewed.

Production: 1984 51.7 T - 1.8 Kg Au; 4.3 Kg Ag; 799 Kg Cu; 2,360 Kg Zn.

EXPLORATION HISTORY

Date	Activity
1976	Staked by owners due to massive sulphide showings. PROS, UG development done including ADIT and tunnel excavation.
1977-1980	Optioned by PLACER DEVELOPMENT. GEOL, GEOC, GEOP, SDD to test massive sulphide showings.
1980-1981	SDD totalling 21 holes, 3,048 m was done. UG development in DRIFT. GEOP (I.P.)
1982-1983	GEOP, GEOC, TREN, SDD. NOTE: 1981-1983 work done under option, primarily tested massive sulphide showings.
1983	UG development done, tunnel intersected downward extension of Slumach Vein. Work done by MAGGIE MINES.
1984	Shipment of gold-bearing ore from Slumach Vein by MAGGIE MINES.
1985	UG and surface exploration by owners.

PROPERTY NAME: Doctors Point   INDEX MAP #: 21
LOCATION: Latitude 49°39.0'   CATEGORY: B
Longitude 122°00.0'   MAP REFERENCE: FIGURE I-L5
NTS #: 92H 12W

ACCESS

By road; 45 km north of Harrison Hot Springs.

DEPOSIT DATA

Geology: Quartz and sulphide (pyrite, arsenopyrite, scorodite) veins with gold and silver contents are contained in a major southeasterly trending fracture system in grey hornfels. The occurrences are located near the contact of hornfels and a younger quartz diorite intrusion. The mineralization is related to hydrothermal activity along the faulted margin of the pluton.

Mineralogy: Pyrite, arsenopyrite, scorodite.

Reserves: 226,796 T at 3.43 g Au/T, 68.56 g Ag/T (Mining Review 1985).

Metallurgy: Not reviewed.

Production: -

EXPLORATION HISTORY

Date	Activity
1981	Property acquired by RHYOLITE RESOURCES and HERITAGE PETROLEUM based on known NAGY occurrences. Additional ground was staked.
1982-1983	Surface exploration and SDD totalling 76 holes completed. SDD, totalling 23 holes, outlined 3 new zones. Ore reserve estimation was done, indicated potential for open pit mining.
1984-1985	SDD - 8 holes, totalling 600 m completed.

PROPERTY NAME: *Texada Island INDEX MAP #: 25
LOCATION: Latitude 49°45.0' CATEGORY: B
Longitude 124°33.0' MAP REFERENCE: FIGURE I-L6
NTS #: 92F 10E, 15E

ACCESS

By water; to Vananda Deep Sea Port, about 15 km from Powell River plus local access roads.

DEPOSIT DATA

Geology: * At present, the prospect consists of six former producing mines and adjacent claims. The property is underlain by volcanic rocks of the Triassic Vancouver Series and Marble Bay limestone which have been intruded by diorite dykes and the Gilles Stock. Ore bodies occur as replacements of limestone, diorite porphyry or Gilles intrusive rocks near the contacts of volcanic rocks and limestone or limestone and intrusive rocks. Mineralization consists primarily of bornite and chalcopyrite with associated gold and silver values and magnetite in a gangue of andradite, epidote and diopside.

Mineralogy: Chalcopyrite, bornite, magnetite, minor pyrite, molybdenite.

Reserves: 598,742 T Fe Ore (pers. comm. 1986). Potential for 45,000 T 1.71 g Au/T, 16.24 g Ag/T, 3-4% Cu estimated (pers. comm. 1986).

Metallurgy: Reviewed report by Haig-Smillie, L.D. (1973), Seawater Floatation, Texada Mines.

Production:

Name	Date	Tonnage	Au (Kg)	Ag (Kg)	Cu (Kg)
Cornell	1897-19	40,687	471.1	2,194.5	1,368,512
Marble Bay	1899-29	284,720	15.5	126.2	67,889
Little Billie	1896, 1907-16, 1948-52	63,711	363.2	1,198.3	819,908
Copper Queen	1907, 14, 1916, 17	749	9.9	75.2	32,417
Texada Mines	1914-21?	946	3.0	36.0	105,070 + Fe
Prescott (incl. Texada Mines)	1957-76	2,571,314	887.4	23,645.2	2,543,020 + Fe
TOTAL		2,962,135T	1,750.1 Kg	27,275.4 Kg	4,936,006 Kg

PROPERTY NAME: *Texada Island INDEX MAP #: 25
LOCATION: Latitude 49°45.0' CATEGORY: B
Longitude 124°33.0' MAP REFERENCE: FIGURE I-L6

EXPLORATION HISTORY

Date	Activity
1880	Quartz vein with free gold discovered on Texada Island.
1883-1908	TEXADA MINES property was developed as a high grade iron ore prospect.
1895	Claims on island were staked for gold and copper ore potential.
1896-1929	Development and lode mining took place on Marble Bay, Copper King, Cornell and Little Billie properties.
1913-1914	Prospecting done and adit driven on Copper Queen property.
1914-1921?	Production at Texada Mines.
1920-1945	Activity generally ceased after World War I. Some production on the Marble Bay property as shown above.
1948-1952	Little Billie mine reopened, development and production took place.
1957-1976	Prescott Mine (including Texada Mine) produced iron ore and copper concentrate which contained some gold, silver (see production of gold, silver and copper above). UG development and DD was done.
1969-1977	Consolidation of properties by IDEAL BASIC INDUSTRIES (the metals company associated with Ideal Cement who has limestone quarries throughout the area). GEOL, GEOC, GEOP, DD was done on the properties.
1973	Metallurgical study of Sea Water Floatation processes for copper practiced at Texada Mines.
1984	Property optioned to CARTIER RESOURCES, SDD done.
1985	Optioned to S. BEALE. RHYOLITE RESOURCES holds the precious metals rights on the Marble Bay claim.

* NOTE: Texada Island property now consists of a number of former producers including Cornell, Marble Bay, Little Billie, Copper Queen, Texada Mines and Prescott Mine.

PROPERTY NAME: Ashlu
LOCATION: Latitude 49°56.8'
Longitude 123°24.6'
NTS #: 92H 14W

INDEX MAP #: 31
CATEGORY: B
MAP REFERENCE: FIGURE I-L7

ACCESS

By road; 13 km by logging road along Ashlu Creek and 32 km by highway along Squamish River, from Squamish.

DEPOSIT DATA

Geology:	Mineralization consisting of chalcopyrite, native gold, argentite, scorodite and scheelite, occurs as irregular masses and disseminations in bands of quartz in a shear zone. The shear follows a basic dyke and cuts granodiorite country rock. The mineralized zone is 94 cm wide (in the underground workings), has been traced for 500 to 600 m along strike and is open at depth.
Mineralogy:	Chalcopyrite, native gold, argentite, scorodite, scheelite.
Reserves:	16,760 T at 6.86 g Au/T (T. Kennedy, 1986).
Metallurgy:	Reviewed report by Bacon, Donaldson and Associates (1981), Metallurgical Investigation of Submitted Gold-Silver Ore from Ashloo Gold Mine.
Production:	1932-1939 13,652 T - 202 Kg Au

EXPLORATION HISTORY

Date	Activity
1923	Staked as Gold Coin property.
1932-1935	Development and mining.
1934-1939	Acquired by ASHLOO GOLD MINING SYNDICATE, UG development and production took place. Mill was on site.
1975-1977	UDD, testing, sampling by ASHLU GOLD MINES. Approximately 1 T of concentrate was recovered.
1978-1979	W. BABKIRK (owner) carried out TREN, ADIT, SDD - totalling 5 holes, 337 m.
1979	OSPREY MINING CO. acquired the property and erected a 100 tpd mill but no mining was done.
1983	OSPREY acquired permits for mining (expl. drilling was to be reinstated but litte was done).
1985	Purchased by TENQUILLE RESOURCES. A property evaluation including examination and sampling of UG workings and a preliminary reserve estimate was done by T. Kennedy Consulting.
1986	Optioned to RAMPAGE RESOURCES.

PROPERTY NAME: Mount Zeballos INDEX MAP #: 36
LOCATION: Latitude 50°00.8' CATEGORY: B
Longitude 126°48.6' MAP REFERENCE: FIGURE I-L8
NTS #: 92L 2W

ACCESS

By road (and trail?); property is located across Spud Creek from Spud Valley prospect.

DEPOSIT DATA

Geology: Shear zones, containing pyrite, arsenopyrite, galena and sphalerite mineralization with values in gold and silver, transect Lower Jurassic Bonanza Group tuff, andesite, hornblendite and lime silicate rocks. Diabase and feldspar porphyry dykes intrude the country rocks. Post mineralization movement has occurred along the shears.

Mineralogy: Pyrite, arsenopyrite, galena, sphalerite.

Reserves: No present reserves.

Metallurgy: Not reviewed.

Production: 1939-1942, 1944 74,268 T - 51.5 Kg Au; 946.6 Kg Ag; 444,399 Kg Cu; 2,408 Kg Pb; 12,726 Kg Zn.

EXPLORATION HISTORY

Date	Activity
1936-1938	Discovered and staked. Two adits excavated - upper adit 129 m in length and lower adit 136 m in length.
1939	Mine developed on 4 levels in 4 drifts started from surface. Shrinkage cut and fill mining taking place in STOPE on 3 levels (1500, 1600, 1800 ft.). 35 to 50 tpd amalgamation/floatation mill installed and operated.
1939-1942	Mining and development.
1940	STOPE on 4 levels (1500, 1600, 1800, 2000 ft. levels). Total development 492.7 m of DRIFT, XCUT, RSE. 248.4 m UDD done.
1941	Three new levels opened (total of 8 levels now developed). STOPE on all other levels. Total development done was 1192 m - DRIFT, XCUT, RSE.
1942	STOPE was done. Mine closed.
1944	Production record in MINFILE indicates some mining was done (see production above).

PROPERTY NAME: Homeward INDEX MAP #: 38
LOCATION: Latitude 50°01.0' CATEGORY: B
Longitude 126°45.8' MAP REFERENCE: FIGURE I-L8
NTS #: 92L 2W

ACCESS

By road; 18 km from Zeballos.

DEPOSIT DATA

Geology:	Five quartz veins containing pyrite, arsenopyrite, sphalerite, galena, calcite and in places free gold occupy shear zones in quartz diorite of the Eocene Zeballos Pluton. Post mineralization movement along the fault has crushed the sulphides. Crosscutting quartz veins are also present.
Mineralogy:	Pyrite, arsenopyrite, sphalerite, galena, native gold.
Reserves:	No present reserves.
Metallurgy:	Not reviewed.
Production:	1940-1942 3,586 T - 46.4 Kg Au; 108.7 Kg Ag; 318 Kg Cu; 347 Kg Pb.

EXPLORATION HISTORY

Date	Activity
1937	Staked.
1938	2 SCUTS on "main vein" were excavated which exposed a 5 to 12.5 cm wide quartz-sulphide vein in an easterly trending shear. 1 SCUT on "high grade" vein exposed 3.8 cm wide shear containing quartz and sulphide mineralization. This work was done by PIONEER MINES.
1939	Acquired by HOMEWARD MINES. 2 ADIT on main or #1 vein. Four veins had been discovered by this time.
1940-1942	Production as summarized above.
1941-1942	50 tpd amalgamation/floatation mill operated.
1945	Fifth vein, called the Forrest vein was discovered while the claims were being surveyed for Crown Grant.

PROPERTY NAME: Van Isle INDEX MAP #: 40
LOCATION: Latitude 50°03.1' CATEGORY: B
Longitude 126°49.9' MAP REFERENCE: FIGURE I-L8
NTS #: 92L 2W

ACCESS

By trail to the property from the Campbell River-Zeballos Highway.

DEPOSIT DATA

Geology:	Andesitic tuff and breccia of the Lower Jurassic Bonanza Group have been intruded by feldspar porphyry dykes. Two main veins, approximately 0.6 m in width, follow northwesterly trending shears and transect the country rocks. Mineralization consists of pyrite, galena, sphalerite, chalcopyrite, and locally abundant arsenopyrite and pyrrhotite, carrying values in gold and silver, in massive or ribboned quartz.
Mineralogy:	Pyrite, galena, sphalerite, chalcopyrite, arsenopyrite, pyrrhotite.
Reserves:	None presently known.
Metallurgy:	Not reviewed.
Production:	1940 3,044 T - 35.9 Kg Au; 16.5 Kg Ag.

EXPLORATION HISTORY

Date	Activity
1933	Seven claims staked.
1934	Surface stripping and SCUT.
1936	Acquired by NOOTKA MINING SYNDICATE. ADIT (1800 level) driven. Production (according to MINFILE) of 4 T; 62 g Au; 62 g Ag.
1937	Acquired by MAN-O-WAR MINES. Continued tunnelling in 1800 level ADIT, totalling 79 m DRIFT. ADIT on 2,000 level started.
1939-1940	Acquired by PRIVATEER MINES, continued UG work. Production was primarily from STOPE above 1800 level. Total workings include 3 ADITS (1800 east, 1800 west and 2000 levels) and a sublevel between 1800 east and 2000 level.

PROPERTY NAME: White Star INDEX MAP #: 41
LOCATION: Latitude 50°01.3' CATEGORY: B
Longitude 126°48.3' MAP REFERENCE: FIGURE I-L8
NTS #: 92L 2W

ACCESS

By trail (?) from Campbell River-Zeballos Highway.

DEPOSIT DATA

Geology:	Quartz diorite of the Eocene Zeballos Pluton is transected by feldspar porphyry dykes and joints. Quartz veins occur in gouge and breccia zones. Mineralization, consisting of pyrite, galena, arsenopyrite, sphalerite and free gold, is usually concentrated in bands along the walls of the veins. Comb quartz is present in diagonal breaks along the fault zones which exhibit some displacement.
Mineralogy:	Pyrite, galena, arsenopyrite, sphalerite, native gold.
Reserves:	No present reserves.
Metallurgy:	Not reviewed.
Production:	1935-1942, 1952, 1957 1,293 T - 220.9 Kg Au; 92.5 Kg Ag; 1,563 Kg Cu; 17,144 Kg Pb; 30 Kg Zn.

EXPLORATION HISTORY

Date	Activity
1933, 1937	Staked.
1934, 1935	SCUT. Several tonnes of high grade ore were mined from the cuts. Ore was packed along trails to tidewater.
1938	Further production from SCUT where later No. 1 adit was excavated. Ore was transported by tram to Spud Creek and backpacked to PRIVATEER road.
1939	Property operated by WHITE STAR MINES. ADIT No. 1 and 2 (on #1 and #2 veins) were extended a total of 238 m. One RSE (7 m) and two STOPE were started. A third ADIT was begun.
1940	Development work took place at 3 levels on 2 veins and included 33.7 m DRIFT and STOPE on all levels.
1941	Mining included 96 m DRIFT and No. 1 and No. 3 level STOPE. UDD totalling 90 m was also done.
1942	No. 3 level STOPE. Mine closed.

PROPERTY NAME: C.D. (Rey Oro)   INDEX MAP #: 42
LOCATION: Latitude 50°01.3'   CATEGORY: B
Longitude 126°47.6'   MAP REFERENCE: FIGURE I-L8

ACCESS

By trail along Gold Valley Creek to the road to Zeballos.

DEPOSIT DATA

Geology: Quartz veins containing arsenopyrite, galena, sphalerite and chalcopyrite with associated values in gold and silver are present in shears. The country rocks consists of quartz diorite which has been intruded by feldspar porphyry dykes and subsequently cut by the mineralized fault zones.

Mineralogy: Arsenopyrite, galena, sphalerite, chalcopyrite.

Reserves: No present reserves.

Metallurgy: Not reviewed.

Production: 1938-1941 5,645 T - 143.1 Kg Au; 44.3 Kg Ag; 470 Kg Cu; 2,982 Kg Pb.

EXPLORATION HISTORY

Date	Activity
1934-36	Staked. Work included stripping and SCUT excavations.
1937	REY ORO GOLD MINING CO. acquired the property. 1200 level ADIT, 109 m DRIFT. Some ore shipped.
1939	Acquired by C.D. MINING CO.
1940	UG work included a WINZ to 1400 level and development of 1300 and 1400 levels.

PROPERTY NAME: Central Zeballos INDEX MAP #: 45
LOCATION: Latitude 50°02.1' CATEGORY: B
Longitude 126°47.0' MAP REFERENCE: FIGURE I-L8
NTS #: 92L 2W

ACCESS

By road; up Nomash River Valley, 10 km from Zeballos.

DEPOSIT DATA

Geology: Sulphides and quartz are present in a shear zone in granodiorite and quartz diorite. The intrusive rocks have invaded older volcanic rocks and limestone. Skarn alteration and showings of replacement mineralization, comprised of chalcopyrite and pyrrhotite are present. Gold and silver mineralization with sulphides similar to other deposits in the Zeballos camp are found in the shear.

Mineralogy: Pyrrhotite, chalcopyrite, sphalerite, galena, arsenopyrite.

Reserves: No present reserves known.

Metallurgy: Not reviewed.

Production: 1938-1947 52,296 T - 636.8 Kg Au; 432.2 Kg Ag; 7,370 Kg Cu; 71,104 Kg Pb.

EXPLORATION HISTORY

Date	Activity
1937	Discovered and staked. SCUT, stripping done.
1938	CENTRAL ZEBALLOS MINING CO. acquired the property. 2 ADIT excavated, and total of 475 m of drifting done. No. 3 adit driven as XCUT and DRIFT, a total 41.9 m advance.
1939	Total 451.5 m UG development on several levels included DRIFT, XCUT, RSE and WINZ. UDD - total 458.4 m.
1940	25 to 40 tpd amalgamation/floatation mill began operation. All STOPE done above No. 2 level. Production included DRIFT, RSE, XCUT, WINZ, a total advance of 675 m.
1940-1941	No. 9 level XCUT (the mill adit) was completed.
1942	RSE driven from No. 9 level to 500 ft. level. DRIFT on 500 level.
1946	Development on No. 5 and No. 9 levels included DRIFT, XCUT, RSE, a total advance of 260 m. UDD totalled 37 m.
1947	Development on No. 6 level totalled 68 m DRIFT.

PROPERTY NAME: Copper Road INDEX MAP #: 48
LOCATION: Latitude 50°11.3' CATEGORY: B
Longitude 125°18.0' MAP REFERENCE: FIGURE I-L9
NTS #: 92K 3W

ACCESS

By water; 2.5 km from Campbell River to Quathiaska Cove and 30 km by road to property.

DEPOSIT DATA

Geology: Sulphides with associated values in silver and gold, occur in a shear transecting Triassic Karmutsen andesite and basalt. The shear zone is 5.2 to 12.2 m in width and has been traced for greater than 500 m. Quartz and carbonate infilling and chlorite alteration is present in sheared and brecciated zones.

Mineralogy: Bornite, chalcocite, chalcopyrite, minor native copper.

Reserves: 151,345 T 3.26% Cu (MRI 80/7 indicates 13.71 g Ag/T also present).

Metallurgy: Not reviewed.

Production: 1953-1968 4,736 T -
715 g Au; 2.5 Kg Ag; 182,878 Kg Cu.

EXPLORATION HISTORY

Date	Activity
1952	Copper mineralization discovered, staked.
1953	PROS, SDD, TREN, SHAFT sunk to 15 m.
1963	GEOL, GEOP, SDD - 3,578 m, 28 holes by ANACONDA.
1965-1968	UG development - DRIFT, RSE.
1969-1970	Optioned by WESTERN MINES. GEOP, GEOC, DD - 10 holes.
1971	Optioned by UNIVEX MINING CORP. Reserve estimate by A.F. Roberts.
1973	DD totalling 2 holes completed.
1975	TREN.

PROPERTY NAME: Lucky Jim INDEX MAP #: 49
LOCATION: Latitude 50°12.3' CATEGORY: B
Longitude 125°16.2' MAP REFERENCE: FIGURE I-L9
NTS #: 92K 3W

ACCESS

By water; 2.5 km from Campbell River to Quathiaska Cove and by road, 25 km to property.

DEPOSIT DATA

Geology: The property is underlain by limestone interbedded with andesite, tuff and breccia. Pyrrhotite, chalcopyrite and pyrite (and some native gold and telluride grains) are present along the contact of limestone and volcanic rocks and in fractures or shear zones which transect the country rock.

Mineralogy: Chalcopyrite, bornite, chalcocite, native gold, sylvanite, arsenopyrite(?)

Reserves: 9,072 T (proven) or 18,143 T (indicated) at 13.7 to 20.6 g Au/T, 51.4 to 68.6 g Ag/T, 2 to 8% Cu (pers. comm. 1986).

Metallurgy: Not reviewed.

Production: 1909, 1916, 1927 478 T -
7.4 Kg Au; 7.1 Kg Ag; 11,274 Kg Cu.

EXPLORATION HISTORY

Date	Activity
early 1900's	Discovered
1909-1910	SHAFT sunk to 34 m.
1909-1927	Production - intermittent (see above).
1962-1970	Explored in conjunction with other properties in area for potential as copper deposit.
1979-1970	Percussion drilling, SDD, GEOL, GEOC, GEOP in conjunction with Copper Road property by WESTERN MINES.
1981	Crown grants purchased by B. Furneaux. Optioned to BUTLER MOUNTAIN MINERALS.
1983	GEOP, GEOC.
1984	DD, TREN, channel sampling, rehabilitation of old workings.

PROPERTY NAME: Independent (Coast Copper)
INDEX MAP #: 50
LOCATION: Latitude 50°21.5'
Longitude 127°14.0'
CATEGORY: B
MAP REFERENCE: FIGURE I-L10
NTS #: 92L 8E

ACCESS

By road; approximately 32 km south of Port McNeill.

DEPOSIT DATA

Geology:	Chalcopyrite and bornite occur as veins, lenses and disseminations in magnetite and garnet-epidote-calcite skarn along a fault i segment of the contact between Karmutsen volcanic rocks and Quatsino Limestone. Pyrite, pyrrhotite and arsenopyrite are also present, in lesser amounts.
Mineralogy:	Chalcopyrite, bornite, magnetite, pyrite, pyrrhotite, arsenopyrite.
Reserves:	753,000 T at 0.68 g Au/T; 1.68% Cu; 31.5% Fe (MINFILE 1982).
Metallurgy:	Not reviewed.
Production:	1968-1969 24,905 T - 62.9 Kg Au; 488.5 Kg Ag; 1,237,176 Kg Cu.

EXPLORATION HISTORY

Date	Activity
	Not reviewed. See COAST COPPER (OLD SPORT).

PROPERTY NAME: Coast Copper (Old Sport)
INDEX MAP #: 51
LOCATION: Latitude 50°22.6'
Longitude 127°14.7'
CATEGORY: B
MAP REFERENCE: FIGURE I-L10
NTS #: 92L 6E

ACCESS

By road; approximately 30 km south of Port McNeill.

DEPOSIT DATA

Geology: Chalcopyrite, bornite, magnetite and arsenopyrite are present in skarn at the contact of Karmutsen volcanic rocks and Quatsino Limestone near gabbro-diorite intrusions.

Mineralogy: Chalcopyrite, bornite, magnetite, arsenopyrite.

Reserves: 454,507 T at 0.69 g Au/T; 1.3% Cu; 33.3% Fe (MINFILE 1982, referred to as Coast Copper Benson Lake 2).

Metallurgy: Not reviewed.

Production: 1962-1973 2,657,593 T - 3,868.8 Kg Au; 11,731.1 Kg Ag; 41,930,033 Kg Cu; 488,726,155 Kg Fe.

EXPLORATION HISTORY

Date	Activity
1915-1931	Extensive UG work done - ADIT, SHAFT.
1960-1964	Production and development. 750 tpd mill installed.
1965-1970	UG work - 1,525 m DRIFT extension onto adjacent Merry Widow property. DD resulted in 3 zones being outlined. Decline driven 1,913 m. Production from this area.
1972	Mine closed.

PROPERTY NAME: Alice Lake Mines
LOCATION: Latitude 50°25.9'
Longitude 127°23.9'
NTS #: 92L 6W

INDEX MAP #: 53
CATEGORY: B
MAP REFERENCE: FIGURE I-L10

ACCESS

By road; approximately 15 km northeast of Port Alice.

DEPOSIT DATA

Geology:	Pyrrhotite, sphalerite, arsenopyrite, galena, calcite and quartz replace Quatsino Limestone near the contact with a quartz porphyry dyke. Another similar showing is present on the property near grey coloured dykes. The latter deposit contains more pyrite and sphalerite.
Mineralogy:	Pyrrhotite, sphalerite.
Reserves:	3,630 T at 0.69 g Au/T; 34.28 g Ag/T; 12.7% Zn - CATHERINE DEPOSIT. 46,267 T at 32.57 g Ag/T; 8% Zn ALICE LAKE DEPOSIT (MINFILE 1982).
Metallurgy:	Not reviewed.
Production:	None.

EXPLORATION HISTORY

Date	Activity
	Not reviewed.

PROPERTY NAME: Yreka
LOCATION: Latitude 50°27.3'
Longitude 127°34.0'
NTS #: 92L 5E

INDEX MAP #: 55
CATEGORY: B
MAP REFERENCE: FIGURE I-L10

ACCESS

By water; 15 km north of Port Alice on Neroutsous Inlet plus local access roads.

DEPOSIT DATA

Geology:	Lower Jurassic Bonanza Group tuff and andesite, interbedded with limestone comprise the country rocks on the property. The Bonanza rocks have been folded and intruded by basalt, diabase and quartz feldspar porphyry dykes and sills. Limy tuffaceous beds have been altered to skarn and contain pyrrhotite, chalcopyrite, pyrite, sphalerite and local magnetite and specularite mineralization.
Mineralogy:	Pyrrhotite, chalcopyrite, pyrite, sphalerite, magnetite, specularite.
Reserves:	350,173 T at 1.37 g Au/T; 34.35 g Ag/T; 2.5% Cu (Mining Review 1985).
Metallurgy:	Not reviewed.
Production:	1902-1904, 1917, 1966-1967 145,344 T - 49.9 Kg Au; 4,537.1 Kg Ag; 3,935,873 Kg Cu.

EXPLORATION HISTORY

Date	Activity
early 1900's	Not reviewed.
1972	GEOP, GEOL, GEOC, DD by ISO EXPLORATIONS.
1983	SAMP, percussion drilling by UKE RESOURCES.
1984	Reserve calculations done (see above).

PROPERTY NAME: Alexandria INDEX MAP #: 56
LOCATION: Latitude 50°29.7' CATEGORY: B
Longitude 125°22.7' MAP REFERENCE: FIGURE I-L9
NTS #: 92K 6W, 11W

ACCESS

By water; 57 km from Campbell River to Picton Point (situated on the shore of Phillips Arm) and by logging roads to vicinity of the property.

DEPOSIT DATA

Geology: Quartz veins with pyrite and minor chalcopyrite mineralization and carrying significant values in gold and silver are present. The veins are present in shear zones transecting highly altered sedimentary rocks which occur as a roof pendant in the Coast Range Batholith. A northwesterly trending structure hosts the Alexandria, Enid-Julie and Doratha-Morton showings.

Mineralogy: Pyrite, chalcopyrite.
Reserves: 24,495 T at 9.98 g Au/T (pers. comm. 1986).
Metallurgy: Not reviewed.

Production: 1940 1,695 T - 22.2 Kg Au; 40.6 Kg Ag; 1,763 Kg Cu.

EXPLORATION HISTORY

Date	Activity
1893	Discovered.
1897-1899	UG development on 5 levels (above sea level) by PHILLIPS ARM GOLD MINING CO.
1932	PREMIER GOLD MINES acquired property. Internal SHAFT sunk. Developed on a further 2 levels (below sea level). Reserve estimate of 14,969 T at 10.28 g Au/T.
1939	PREMIER dropped the property.
1940	Mine reopened. Workings dewatered to 100 foot level. STOPE between 100 level and No. 2 tunnel. Production - hand sorted ore shipped.
1976-77	CORPAC carried out surface exploration - GEOC (soil), GEOL.
1982	Acquired by CHARLEMAGNE RESOURCES.
1983	Rehabilitation of workings, SAMP of levels and adits, GEOC, DD totalling 487.7 m done. Estimate of drill indicated reserves (see above).
1985	Workings dewatered, further SAMP. Optioned by FALCONBRIDGE. GEOL, GEOC, GEOP, UDD - 15 holes totalling 2,000 m done.

PROPERTY NAME: Doratha-Morton INDEX MAP #: 57
LOCATION: Latitude 50°30.9' CATEGORY: B
Longitude 125°24.5' MAP REFERENCE: FIGURE I-L9
NTS #: 92K 11W

ACCESS

By water; 57 km from Campbell River to Picton Point (situated on the shore of Phillips Arm) and by logging road to vicinity of the property.

DEPOSIT DATA

Geology:	Mineralization occurs in numerous bands, stringers and lenses of quartz in a shear zone near the contact of Coast Range granite and altered sedimentary rocks. Gold and silver values are associated with the presence of pyrite and tellurides.
Mineralogy:	Pyrite, tellurides.
Reserves:	18,143 T at 8.57 g Au/T; 17.14 g Ag/T (pers. comm. 1986).
Metallurgy:	Reviewed note to Signet Resources by Harris, C.R. (1985), Tellurides in Doratha-Morton Samples.
Production:	1898-1925 9,303 T - 143 Kg Au; 330.7 Kg Ag; 1,090 Kg Cu.

EXPLORATION HISTORY

Date	Activity
late 1800's	Discovered.
1897-1899	Development with Alexandria (see Min Inv #56), Enid-Julie and Commonwealth deposits. Production for Alexandria included all four deposits.
1898-1925	Development and production.
1983	Acquired by SIGNET RESOURCES. UG GEOL, SAMP of workings carried out.
1984	TREN, GEOL (UG and surface mapping), DD.
1985	TREN, UDD - 5 holes, totalling 390 m done.

PROPERTY NAME: Caledonia INDEX MAP #: 59
LOCATION: Latitude 50°38.5' CATEGORY: B
Longitude 127°36.0' MAP REFERENCE: FIGURE I-L10
NTS #: 92L 12E

ACCESS

By road; 14 km southwest of Port Hardy.

DEPOSIT DATA

Geology:	Magnetite, chalcopyrite, specularite, bornite, pyrite and galena occur in an epidote-garnet skarn zone at the contact between Karmutsen volcanic rocks, Quatsino limestone and granodiorite. East of the workings, chalcopyrite is present in skarn altered limestone at the contact of limestone and volcanic rocks and in fractures in the volcanic rocks. Bornite is present in places as a replacement of some siliceous and tuffaceous beds in the Karmutsen rocks.
Mineralogy:	Magnetite, chalcopyrite, specularite, bornite, pyrite, galena.
Reserves:	68,040 T at 0.34 g Au/T; 701.4 g Ag/T; 6.01% Cu, 0.6% Pb; 7.45% Zn (MRI 80/7).
Metallurgy:	Not reviewed.
Production:	1929 1 T - 467 g Ag; 66 Kg Cu.

EXPLORATION HISTORY

Date	Activity
1927-1929	UG development, totalled several hundred feet.
1929	Small production.
1966-1972	GEOP, GEOC, TREN, DD.
1972	Ore reserve estimate done (see above).

PROPERTY NAME: Ikeda Mine INDEX MAP #: 61
LOCATION: Latitude 52°17.6' CATEGORY: B
Longitude 131°10.9' MAP REFERENCE: FIGURE I-L11
NTS #: 103B 6E

ACCESS

By road; about 5 km from Jedway on Moresby Island (Queen Charlotte Islands).

DEPOSIT DATA

Geology: Deposits are small, structurally controlled skarn bodies which contain chalcopyrite, magnetite and sphalerite mineralization and carry erratic values in precious metals.

Mineralogy: Chalcopyrite, magnetite, sphalerite.

Reserves: 22,680 T at 1.5 to 2.0% Cu, some Au, Ag (BCDM Bull 54, 1964).

Metallurgy: Not reviewed.

Production: 1906-1920 13,410 T - 51.2 Kg Au; 862.6 Kg Ag; 574,055 Kg Cu.

EXPLORATION HISTORY

Date	Activity
1898-1920	UG development in 4 adits carried out. UDD done. Intermittent production beginning in 1906.
1958	GEOP survey done.
1964	DD.
1980's	Work by FALCONBRIDGE.
1985	GEOL, GEOP (airborne), GEOC, SDD - 25 holes totalling 590 m carried out.

PROPERTY NAME: Ecstall INDEX MAP #: 74
LOCATION: Latitude 53°52.4' CATEGORY: B
Longitude 129°30.6' MAP REFERENCE: FIGURE I-L14
NTS #: 103H 13E, 14W

ACCESS

By trail; approximately 45 kilometers southeastward along the Ecstall River from Port Essington. Port Essington is located near the mouth of the Skeena River.

DEPOSIT DATA

Geology:	Pyrite, sphalerite, chalcopyrite and galena occur as massive replacements of certain favourable beds in Paleozoic schist, quartzite and granitoid gneiss remnants within Coast Intrusions.
Mineralogy:	Pyrite, sphalerite, chalcopyrite, galena.
Reserves:	*589,670 T at 1.03 g Au/T; 34.28 g Ag/T; 1.9% Cu, 2.3% Zn (MRI 80/7).
Metallurgy:	1947 test sample results (see below).
Production:	None.

EXPLORATION HISTORY

Date	Activity
1901-1903	ADIT driven to 33 m, DD and BULK sampling done.
1917-1920	DD
1923	DD, metallurgical testing done.
1937-1940	GEOP, DD. New ADIT driven to 875 m, 427 m DRIFT, RSE.
1947	Metallurgical testing done - sample returned values of 1.35% Cu, 0.86% Zn, 0.69 g Au/T which yielded a copper concentrate of 30% Cu, 12.34 g Au/T at an 82% recovery.
1966	BULK sampling and metallurgical testing.
1975	GEOP (EM).
1981	GEOP by E & B EXPLORATIONS.

* NOTE - Bulk Tonnage Reserves
- 4,535,924 T at 0.69 g Au/T; 24.34 g Ag/T; 0.8% Cu; 0.2% Pb; 2.3% Zn; 49.35% S; 42.75% Fe.

Includes Reserves of: 589,670 T at 1.03 g Au/T;
34.28 g Ag/T; 1.91% Cu; 2.3% Zn.

PROPERTY NAME:	Bonanza, Black Bear	INDEX MAP #:	78
LOCATION:	Latitude 55°23.7'	CATEGORY:	B
	Longitude 129°50.9'	MAP REFERENCE:	FIGURE I-L16
NTS #:	103P 5W		

ACCESS

By water (and trail); up Granby Bay approximately 4 km south of Anyox or 4 km southwest of Granby Point (#79).

DEPOSIT DATA

Geology:	Mid-Jurassic Hazelton Group andesitic pillow lavas host concordant massive sulphide mineralization near the contact with an overlying sequence of siltstone and greywacke.
Mineralogy:	Chalcopyrite, pyrrhotite, sphalerite.
Reserves:	226,800 T at 1.0% Cu (MRI 80/7).
Metallurgy:	Not reviewed.
Production:	1929-1935 Tonnage unknown; 86.6 Kg Au; 8,747.5 Kg Ag; 14,312,617 Kg Cu.

EXPLORATION HISTORY

Date	Activity
1901-1902	UG development in several adits, 245 m tunnelling done.
1913	DD
1929-1934	SHAFT sunk to 208.5 m depth, UG development and production. Ore shipped to Anyox smelter.
1976	GEOC.

PROPERTY NAME: Granby Point INDEX MAP #: 79
LOCATION: Latitude 55°24.8' CATEGORY: B
Longitude 129°47.8' MAP REFERENCE: FIGURE I-L16
NTS #: 103P 5W

ACCESS

By water; up Observatory Inlet, approximately 155 km northeastward from Prince Rupert.

DEPOSIT DATA

Geology: Gold and silver are present in a quartz vein in Middle Jurassic Hazelton Group argillite.

Mineralogy: Gold, silver.

Reserves: No present reserves known.

Metallurgy: Not reviewed.

Production: 1917-1938 56,287 T - 180.2 Kg Au; 6,104.3 Kg Ag.

EXPLORATION HISTORY

Date	Activity
1917-1938	Production from this vein and others in the area, such as Golskeish, was primarily mined for their silica content for flux at the ANYOX smelter. The gold and silver derived were significant by products. Total above does not include Golskeish production 1918-1929 - 149.1 Kg Au; 822.1 Kg Ag as shown in Table B.

PROPERTY NAME: Outsider Group INDEX MAP #: 82
LOCATION: Latitude 55°28.5' CATEGORY: B
Longitude 130°00.1' MAP REFERENCE: FIGURE I-L16
NTS #: 103O 8E

ACCESS

By water; along Portland Canal, approximately 60 km south of Stewart.

DEPOSIT DATA

Geology:	Quartz veins in fault zones occur at the contact of cherty argillite and amphibolite of the Hazelton Group. The major vein is 0.6 to 3.6 m wide, has been traced for 914 m along a north to northeasterly strike and contains chalcopyrite, pyrrhotite and minor pyrite mineralization.
Mineralogy:	Chalcopyrite, pyrrhotite, pyrite.
Reserves:	181,440 T at 1.5% Cu (MINFILE 1982).
Metallurgy:	Not reviewed.
Production:	1906-1907, 1924-1928 125,966 T - 2.1 Kg Au; 151.9 Kg Ag; 2,388,798 Kg Cu.

EXPLORATION HISTORY

Date	Activity
1906	Original development by ALASKA BROWN CO. 9 levels, total 610 m of UG excavations.
1906-1907	Production by ALASKA BROWN CO.
1924-1925	Production of low copper, high silica ore for flux at Anyox.
1927	Shut down because a source located closer to Anyox was discovered.
1972	UG development including ADIT, DRIFT by ALASKA KENAI OILS LTD. Tunnel stopped short of sulphide zone.

PROPERTY NAME: Lucky Seven INDEX MAP #: 87
LOCATION: Latitude 55°58.2' CATEGORY: B
Longitude 129°54.6' MAP REFERENCE: FIGURE I-L17
NTS #: 103P 13W

ACCESS

By trail; to confluence of Albany and Glacier Creeks, from Stewart-Cassiar Highway, 5 km north of Stewart.

DEPOSIT DATA

Geology:	Pyrite, galena, sphalerite and arsenopyrite are present in quartz veins in a major fault zone which cuts argillite of Jurassic age.
Mineralogy:	Pyrite, galena, sphalerite, arsenopyrite.
Reserves:	11,193 T at 2.23 g Au/T; 208.77 g Ag/T; 1.58% Pb; 1.87% Zn over 1.65 m (MRI 80/7).
Metallurgy:	Not reviewed.
Production:	1911-1912 8,164 T - 19.0 Kg Au; 804.6 Kg Ag; 127,046 Kg Pb.

EXPLORATION HISTORY

Date	Activity
1905-1911	UG work included 3 ADIT, SHAFT.
1911-1912	UG development and production. Mill operated intermittently.
1913-1914	ADIT, XCUT.
1955	SAMP
1971-1973	GEOC, DD.

PROPERTY NAME: Dunwell INDEX MAP #: 88
LOCATION: Latitude $55^{\circ}59.6'$ CATEGORY: B
Longitude $129^{\circ}55.2'$ MAP REFERENCE: FIGURE I-L17
NTS #: 103P 13W

ACCESS

By trail; along Glacier Creek, from Stewart-Cassiar Highway 3.5 km north of Stewart.

DEPOSIT DATA

Geology:	Several quartz veins, hosted by Lower Hazelton Group argillite, are present on the property. The main structure, the Dunwell vein, contains pyrite, galena, sphalerite, tetrahedrite and chalcopyrite and lesser amounts of argentite, pyrargyrite, electrum and native silver. The sulphides comprise 75% of the vein material in places.
Mineralogy:	Pyrite, galena, sphalerite, tetrahedrite, chalcopyrite, rare argentite, pyrargyrite, trace electrum and native silver.
Reserves:	No present reserves.
Metallurgy:	Not reviewed.
Production:	1926-1941 45,709 T (milled) - 307.2 Kg Au; 10,257.9 Kg Ag; 12,253 Kg Cu; 838,160 Kg Pb; 1,108,858 Kg Zn.

EXPLORATION HISTORY

Date	Activity
1913	Staked. Early exploration by STEWART MINING & EXPL., NASS RIVER LANDS.
1922	DUNWELL MINES incorporated.
1922-1926	Exploration and development.
1926	100 tpd mill installed, aerial tram constructed. Development and production took place.
1932-1941	Exploration by various companies.
1980	Rehabilitation of 3 out of 4 original levels of workings, SAMP and UDD - 1 hole, by SILVER PRINCESS MINES. Results included intersection of 1.07 m at a grade of 13.71 Au/T.

PROPERTY NAME: Indian
INDEX MAP #: 91
LOCATION: Latitude 56°04.6'
Longitude 130°03.0'
CATEGORY: B
MAP REFERENCE: FIGURE I-L17
NTS #: 104B 1E

ACCESS

By road; 25 km north of Stewart on Granduc Road.

DEPOSIT DATA

Geology: The property lies at the contact of Texas Creek granodiorite and altered cataclastic rocks derived from Hazelton Group conglomerate. Irregular, fissure-type, quartz veins and stockworks contain sulphide mineralization. Veins are 0.5 to 6 m wide, and are present in a 121 m wide zone which has been traced for 365 m.

Mineralogy: Galena, sphalerite, pyrite.

Reserves: No recent reserve estimate.

Metallurgy: Not reviewed.

Production: 1925, 1947, 1952-1953 12,780 T - 3.9 Kg Au; 154.0 Kg Ag; 565,579 Kg Pb; 707,331 Kg Zn.

EXPLORATION HISTORY

Date	Activity
pre-1924	UG development totalled 1,220 m, DD totalled 610 m.
1923-1924	UDD - total 1,250 m, SDD - total 167 m completed. UG exploration done but results were discouraging.
1925	33.6 T ore shipped to Premier mill. Ore had average grade of 4.11 g Au/T, 445.6 g Ag/T, 33% Pb, 18% Zn.
1947, 1952-1953	Production (see above).
1983	Exploration by ESSO RESOURCES included DD - 2 holes totalling 189 m.
1985	Exploration by ESSO RESOURCES included TREN and DD - 4 holes totalling 457 m.

PROPERTY NAME: Red Cliff INDEX MAP #: 92
LOCATION: Latitude 56°05.8' CATEGORY: B
Longitude 129°53.6' MAP REFERENCE: FIGURE I-L17
NTS #: 104A 4W

ACCESS

By road. Property is located approximately 2 km from Stewart-Cassiar Highway, near junction of American and Bear Rivers.

DEPOSIT DATA

Geology: Pyrite and chalcopyrite occur as lenses, pods and streaks in coarsely crystalline quartz veins in lenses in shear zones and disseminated in shear zones. Host rocks are volcanic conglomerate, feldspathic sandstone and argillite and thin andesite flows which have been cataclastically deformed.

Mineralogy: Pyrite, chalcopyrite.

Reserves: Unknown.

Metallurgy: Not reviewed.

Production: 1912, 1930 1,168 T - 5.0 Kg Au; 1.2 Kg Ag; 40,431 Kg Cu.
1973 3,003 T - unknown.

EXPLORATION HISTORY

Date	Activity
Pre-1973	Not reviewed.
1973	Rehabilitation of old workings and DD was done. Ore was retrieved from an open stope and old waste dumps and shipped to ADAM mill.

PROPERTY NAME: Silver Butte INDEX MAP #: 93
LOCATION: Latitude 56°06.0' CATEGORY: B
Longitude 130°02.0' MAP REFERENCE: FIGURE I-L17
NTS #: 104B 1E

ACCESS

By road; 24 km from Stewart on the Granduc Mine road.

DEPOSIT DATA

Geology: Veins and quartz stockworks are hosted by Hazelton volcanic rocks. Mineralization consists of pyrite, sphalerite, galena and chalcopyrite with associated values in gold and silver.

Mineralogy: Pyrite, sphalerite, galena, chalcopyrite.

Reserves: No published reserves.

Metallurgy: Not reviewed.

Production: None.

EXPLORATION HISTORY

Date	Activity
1930's	Surface exploration done included TREN by BUENA VISTA MINES. At that time the claims were part of the Big Missouri property which produced in the 1930's. No workings exist on the Silver Butte.
1971	GEOC survey carried out by EL PASO CO.
1979	Stripping, GEOC, GEOP (IP) carried out by SILVER BUTTE MINES.
1980	Optioned to ESSO RESOURCES.
1980-1981	GEOL, GEOC, TREN by ESSO RESOURCES.
1982-1983	GEOL, GEOC, TREN, GEOP, SDD - 13 holes totalling 1,680 m carried out by ESSO RESOURCES.
1985	Optioned by TENATON SILVER CORP. Road construction was done and an attempt was made to collar a portal.

PROPERTY NAME: George Gold-Copper (Bear Pass) INDEX MAP #: 94
LOCATION: Latitude 56°06.2' CATEGORY: B
Longitude 129°45.9' MAP REFERENCE: FIGURE I-L17
NTS #: 104A 4E

ACCESS

By road; approximately 30 km north to northeast of Stewart on Stewart-Cassiar Highway.

DEPOSIT DATA

Geology: The property is underlain by a sequence of Hazelton Group rocks including andesitic flows, pyroclastics and volcaniclastic rocks overlain by cherty iron formation tuff and argillite and subsequently overlain by andesite breccia and tuff. Deposits consist of copper and gold bearing veins, disseminated mineralization in argillite, tuff and iron formation and pyrite and chalcopyrite stringers in andesite at the top of the sequence.

Mineralogy: Pyrite, magnetite, arsenopyrite, chalcopyrite, sphalerite, galena.

Reserves: 455,000 T at 2.06 g Au/T; 17.14 g Ag/T; 1.2% Cu (MRI 80/7).

Metallurgy: Not reviewed.

Production: None.

EXPLORATION HISTORY

Date	Activity
early 1900's	Lucky Frenchman property staked. Frenchman tunnel driven.
1910	Claim covering George Gold-Copper showing was staked.
1911-1919	UG work in 2 adits done on George property.
1925	Lucky Frenchman showing restaked as Enterprise Group by GEORGE ENTERPRISE MINING CO. Company also acquired Heather Group (located on the south side of the Bear River).
1925-1927	Extensive PROS on Heather and Enterprise Groups, over 60 m of tunnels were driven on showings.

PROPERTY NAME: George
Gold-Copper
(Bear Pass)
INDEX MAP #: 94
LOCATION: Latitude 56°06.2'
Longitude 129°45.9'
CATEGORY: B
MAP REFERENCE: FIGURE I-L17
NTS #: 104A 4E

EXPLORATION HISTORY

Date	Activity
1926	George Gold-Copper property was optioned by CONS MINING AND SMELTING. Exploration done included DD - 8 holes totalling 2,500 m.
1927-1929	TREN, GEOL, DD on George property.
1928	PROS on Heather Group.
1929-1935	TREN, PROS on Heather, Enterprise Groups.
1950	ADIT and tunnel (15 m) excavated on Heather showing.
1974	Heather and Enterprise Groups optioned by TOURNIGAN MINING EXPLORATIONS LTD.
1976	TOURNIGAN purchased Enterprise, Heather and George Gold-Copper properties and staked further ground. Exploration program included: GEOL, TREN, SAMP near George adit and DD - 2 holes totalling 51 m on stratabound sulphide zone on George. GEOL, DD - 2 holes totalling 52 m on Enterprise. PROS on Heather.
1977-1978	TOURNIGAN acquired Red Top, New York, Argenta, Rufus Groups. GEOL, SAMP done on new ground. Complete property now called BEAR PASS PROPERTY.
1981-1982	GEOL done on George, Heather and Enterprise showings.

PROPERTY NAME: Goat
LOCATION: Latitude 56°09.1'
Longitude 129°33.6'
NTS #: 104A 1E

INDEX MAP #: 96
CATEGORY: B
MAP REFERENCE: FIGURE I-L17

ACCESS

By road; 11 km north on mountain road from Stewart-Cassiar Highway. Junction of roads at approximately 20 km west of Meziadin Junction.

DEPOSIT DATA

Geology: The property is underlain by schistose, green andesitic agglomerate and intercalated siltstone of the Hazelton Group. Mineralization occurs in veins, the F, G, and E veins, and consists of sphalerite, arsenopyrite, pyrite, galena and freibergite within a gangue of siderite and lesser amounts of quartz, epidote, calcite and scheelite. The discovery vein (F) trends northerly, dips steeply to the west and averages 15 cm in width.

Mineralogy: Sphalerite, galena, freibergite, arsenopyrite, pyrite.

Reserves: *27,300 T at 10.28 g Au/T; 4,456.4 g Ag/T over 0.25 m vein width (pers. comm. 1986).

Metallurgy: Brief description in 1980 activity (see below).

Production: 1975(?) unknown T - 15.9 Kg Ag; 147 Kg Pb; 776 Kg Zn
1980 2721.5 T - unknown.

EXPLORATION HISTORY

Date	Activity
1920's	Early exploration.
1964-1968	Exploration.
1968	UG work done.
1974	UG development and exploration by NORDORE MINING CO.
1975	Production of unknown quantity of ore (according to MINFILE).
1979	Floatation mill treated approximately 900 T ore, produced Zn concentrate.

PROPERTY NAME: Goat
INDEX MAP #: 96
LOCATION: Latitude 56°09.1'
Longitude 129°33.6'
CATEGORY: B
MAP REFERENCE: FIGURE I-L17
NTS #: 104A 1E

EXPLORATION HISTORY

Date	Activity
1980	Production took place 2,700 T of material mined. 544 T of stockpiled ore was milled. Shipment of 1,100 T ore and 27 T concentrate to Cominco smelter was made.
1981	Mill destroyed by fire.
1983	NORDORE and NOR-QUEST RESOURCES formed GOATRIDGE MINING PARTNERSHIP to raise funds for new mill. Property has been dormant since then.

* Note: Minfile (1982) reports reserves of 2,000 T at 4,782.1 g Ag/T; 10.63 g Au/T.

APPENDIX C

APPENDIX C

NOTES ON ABBREVIATIONS AND UNITS USED ON TABLES AND DATA SHEETS

(1) DEPOSIT TYPES:

REPL = replacement

MASS. SULF = massive sulphide

DISS = disseminated

STWK = stockwork

FRACT = fracture

(2) UNITS, COMMODITIES:

(a) All figures are given in metric units unless otherwise indicated. These include:

T = metric tonnes

Kg = kilograms

m = metres

g/T = grams/metric tonne

(b) Commodities are given in conventional elemental abbreviations, for example Au - gold; Ag - silver; Cu - copper, etc.

(c) All values for commodities other than gold and silver are given in percent (%).

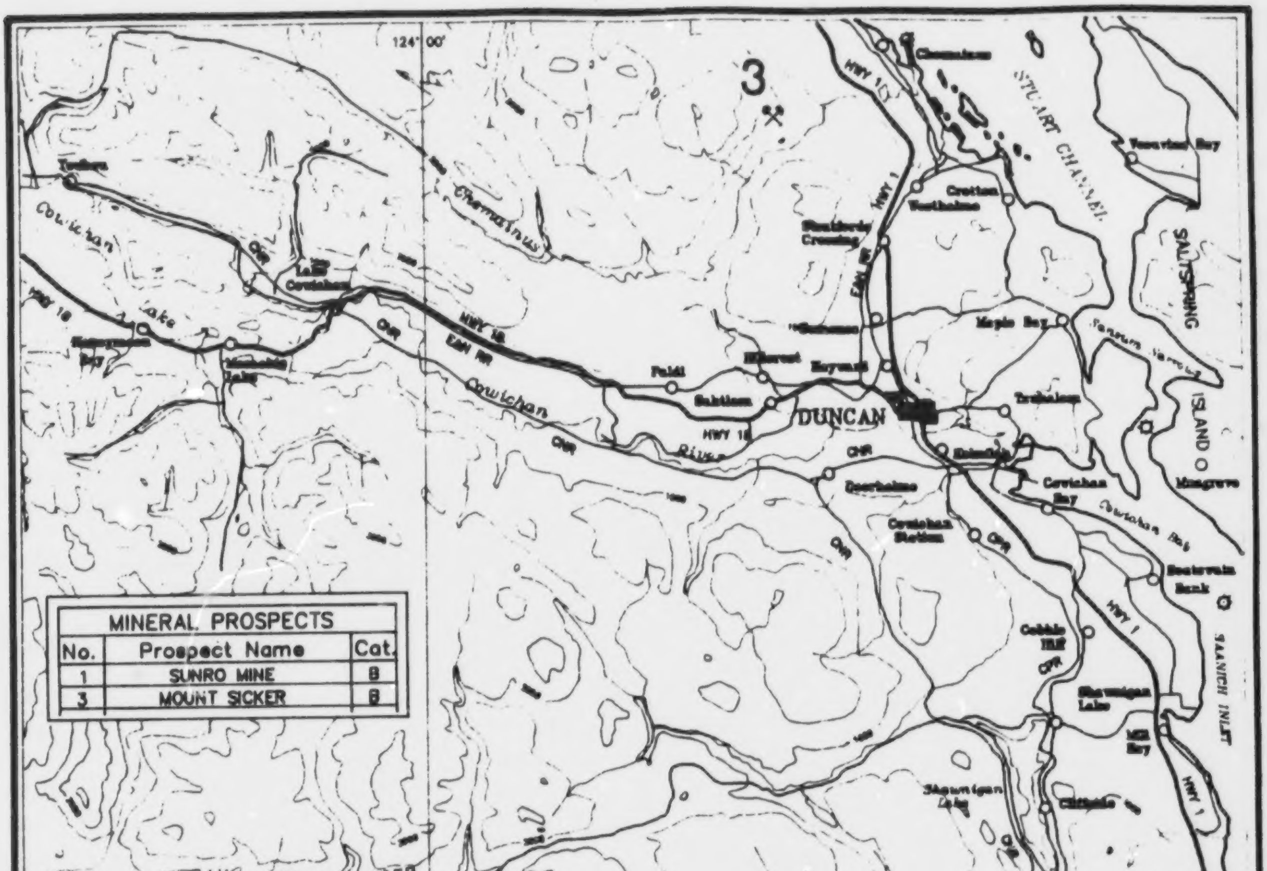
(3) EXPLORATION DATA:

PROS = prospecting
GEOL = geological mapping
GEOC = geochemical sampling
GEOP = geophysical surveying
  EM - electromagnetic
  SP - self potential
  IP - induced polarization
  MAG - magnetic
TREN = trenching
SAMP = sampling, probably for assay
BULK = bulk sampling
DD = drilling
SDD = surface diamond drilling
UDD = underground diamond drilling

(4) DEVELOPMENT DATA:

UG = underground
SCUT = surface cut, open cut excavating
ADIT = adit excavating
DRIFT = drifting
XCUT = crosscutting
RSE = raising
WINZ = winze excavating
SHAFT = shaft excavating

LOCATION MAPS - CATEGORIES A AND B



124° 00'
3
Chemainus
STUART CHANNEL
Vesuvius Bay
Crofton
Westholme
SALTSPRING ISLAND
Youbou
Cowichan Lake
Chemainus
Lake Cowichan
Mesachie Lake
Honeymoon Bay
HWY 18
E&N RR
CNR
Maple Bay
Somenos
Hillcrest
Paldi
Sahtlam
DUNCAN
Cowichan River
Koksilah
Cowichan Bay
Deerholme
Cowichan Station
Musgrave
Cobble Hill
Shawnigan Lake
Mill Bay
SAANICH INLET
HWY 1
CPR
Bamberton
SAN JUAN RIVER
SAN JUAN RIDGE
Sooke Lake
Leechtown
48° 30'
Diversion Reservoir
JORDAN RIDGE
Goldstream
1
River Jordan
HWY 14
Shirley
Otter Point
Milnes Landing
Sooke
Sooke Basin
Sooke Bay
ORVEAS BAY
STRAIT of JUAN DE FUCA
124° 00'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
1	SUNRO MINE	B
3	MOUNT SICKER	B

NOTES:
Contour interval 1000 feet

Drawn by
INTEGREX ENGINEERING, Vancouver, B.C.

N.T.S. 92B, 92C

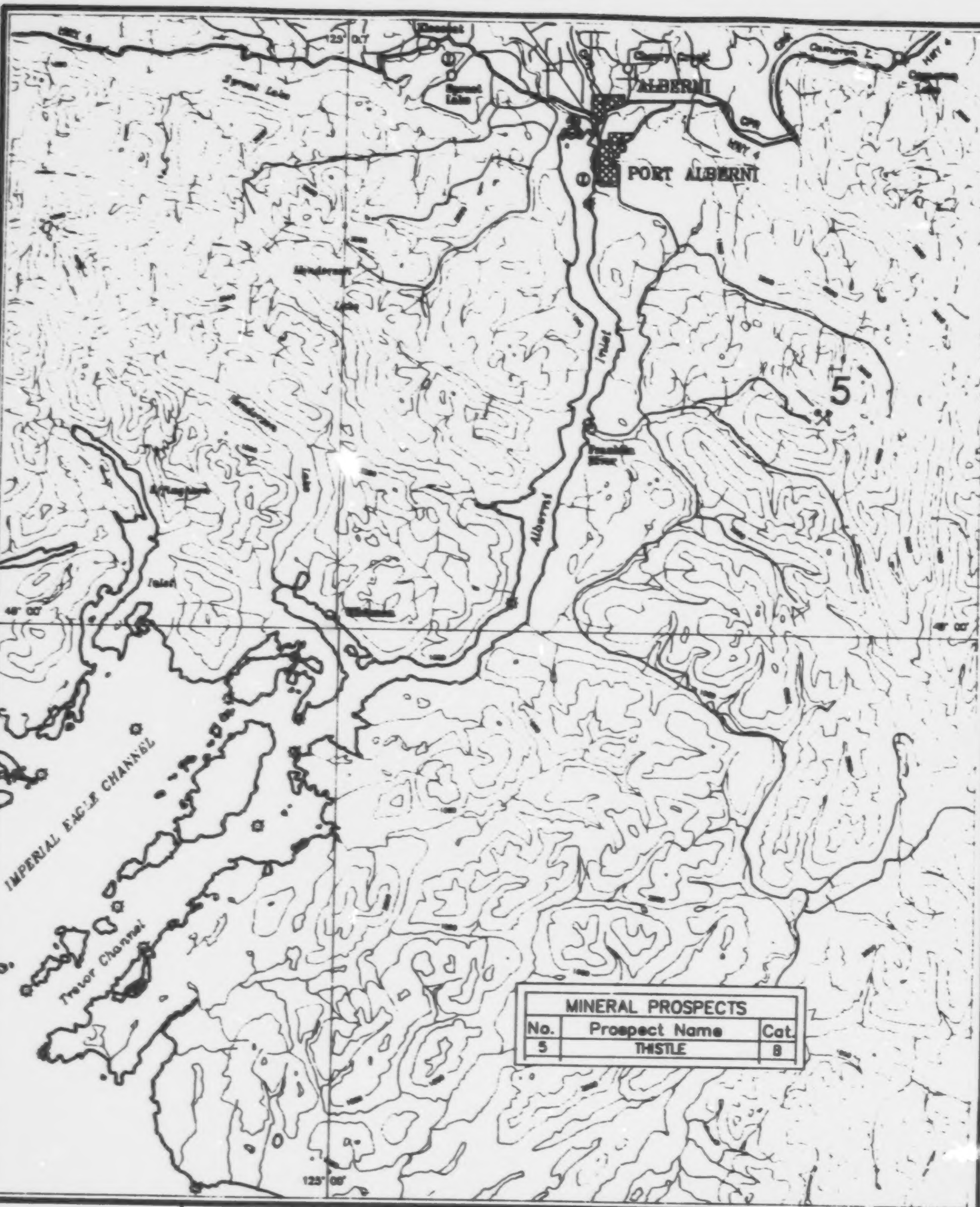
5 MILES 0 5
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000
DATE: MARCH 1986
S. GARDINER
FIGURE: I-L1


HWY 4
125° 00'
Sproat Lake
Sproat Lake
Cherry Creek
ALBERNI
PORT ALBERNI
Cameron L.
HWY 4
Henderson Lake
Alberni Inlet
Franklin River
5
Inlet
49° 00'
49° 00'
IMPERIAL EAGLE CHANNEL
Trevor Channel
125° 00'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
5	THISTLE	B

NOTES:

Contour interval 1000 feet

Drawn by:
[illegible], Vancouver, B.C.

N.T.S. 92C, 92F

5 MILES 0 5

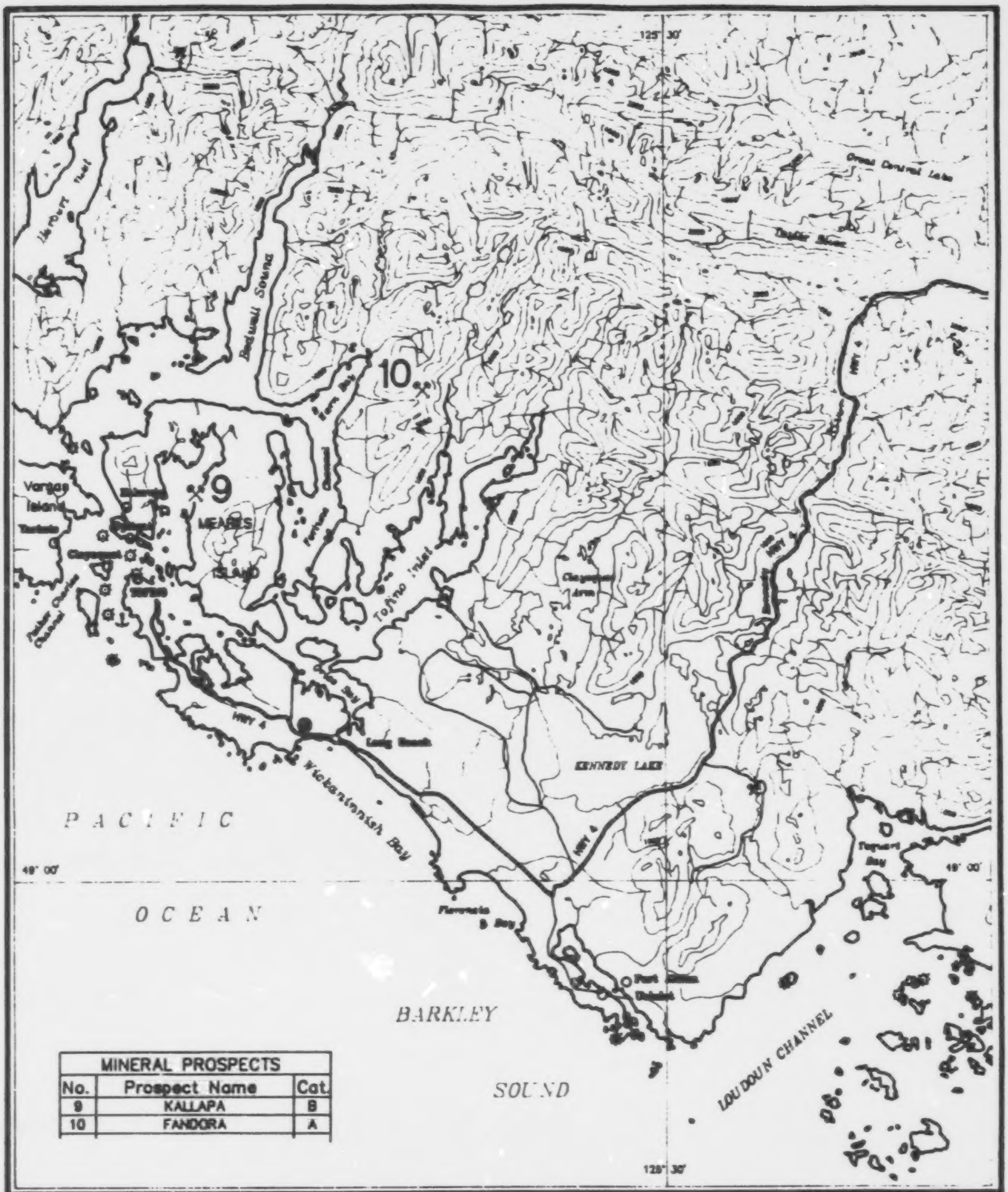
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000
DATE: MARCH 1986
S. GARDINER
FIGURE: I-L2


125° 30'
Bedwell Sound
Vargas Island
MEARES ISLAND
9
10
Tofino Inlet
Clayoquot Arm
HWY 4
Long Beach
Wickaninnish Bay
KENNEDY LAKE
PACIFIC OCEAN
49° 00'
Florencia Bay
Ucluelet
BARKLEY SOUND
LOUDOUN CHANNEL
Toquart Bay
Great Central Lake
125° 30'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
9	KALLAPA	B
10	FANDORA	A

NOTES:
Contour interval 1000 feet

Drawn by [illegible] ENGINEERING, Vancouver, B.C.

N.T.S. 92C, 92F

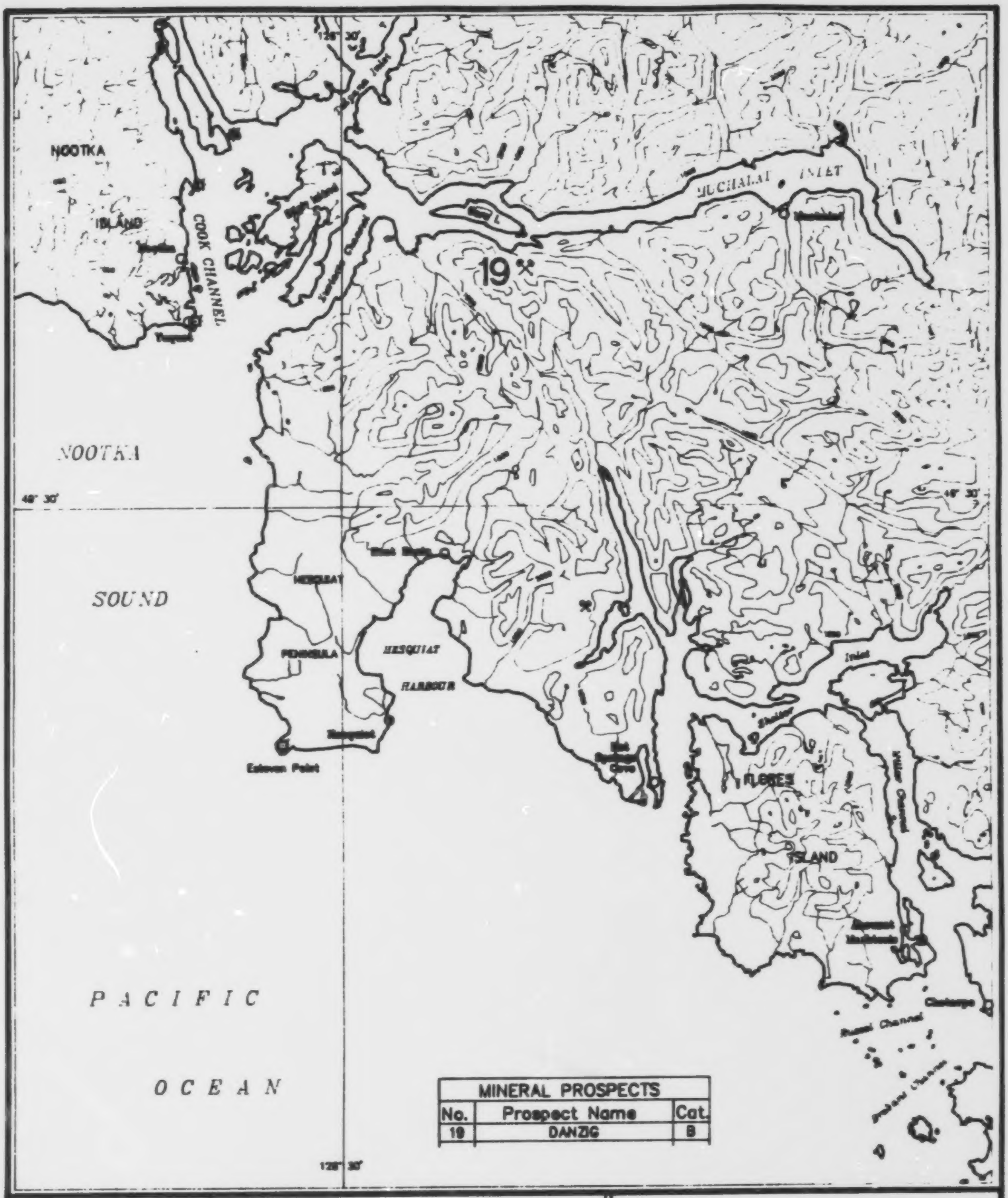
5 MILES 0 5
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000
DATE: MARCH 1986
S. GARDINER
FIGURE: I-L3


126° 30'
NOOTKA
ISLAND
Yuquot
COOK CHANNEL
MUCHALAT INLET
19
NOOTKA
SOUND
49° 30'
49° 30'
Boat Basin
HESQUIAT
PENINSULA
HESQUIAT
HARBOUR
Hesquiat
Estevan Point
Hot Springs Cove
Shelter Inlet
FLORES
ISLAND
Millar Channel
PACIFIC
OCEAN
126° 30'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
19	DANZIG	B

NOTES:
Contour interval 1000 feet

Drawn by
INTEGREX ENGINEERING, Vancouver, B.C.

N.T.S. 92E

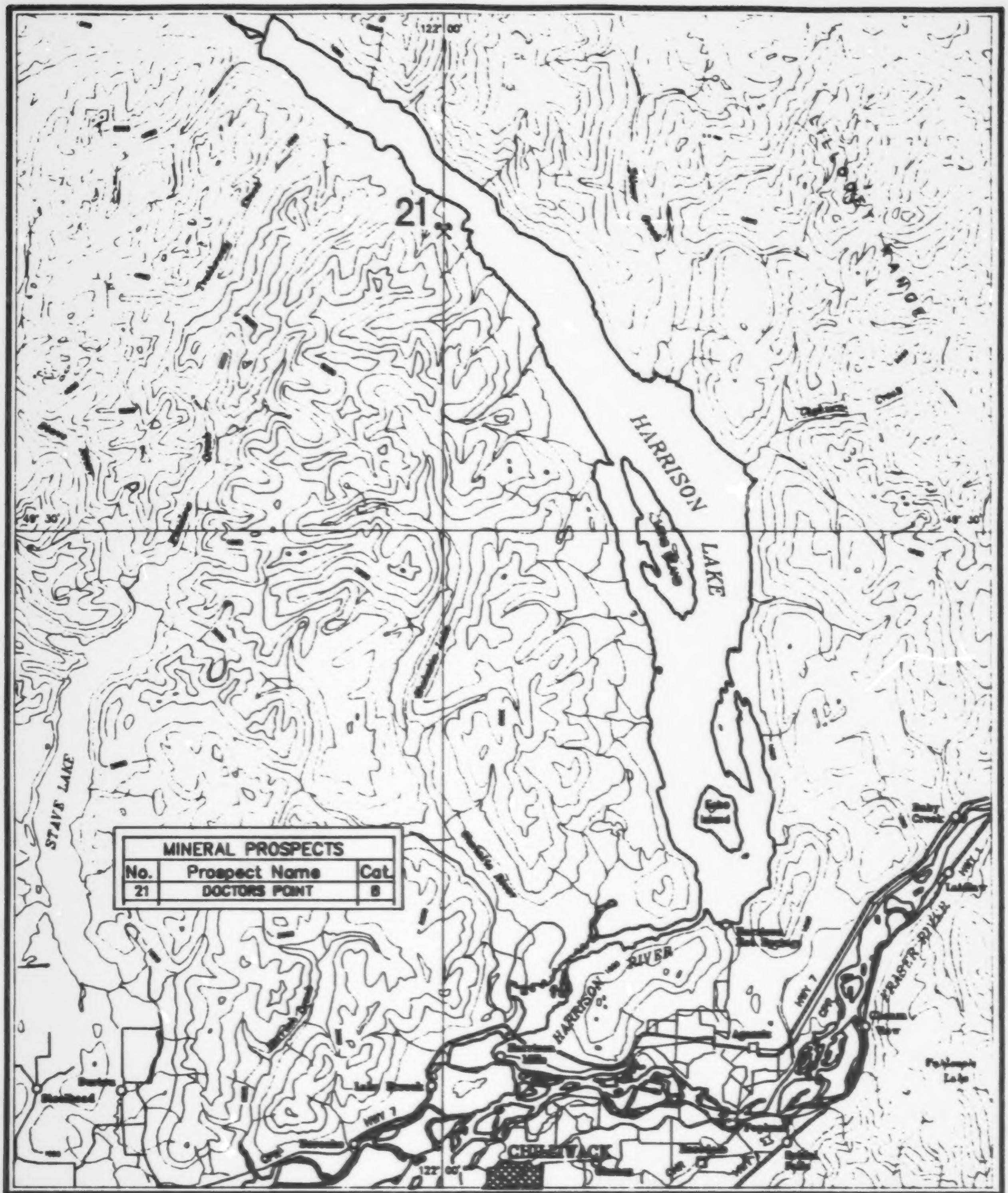
5 MILES 0 5
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000	DATE: MARCH 1986
S. GARDINER	FIGURE: I-L4


122° 00'
21
HARRISON LAKE
STAVE LAKE
49° 30'
HARRISON RIVER
FRASER RIVER
HWY 7
CHILLIWACK
122° 00'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
21	DOCTORS POINT	8

NOTES:

Contour interval 1000 feet

Drawn by [illegible], Vancouver, B.C.

N.T.S. 92G, 92H

5 MILES 0 5

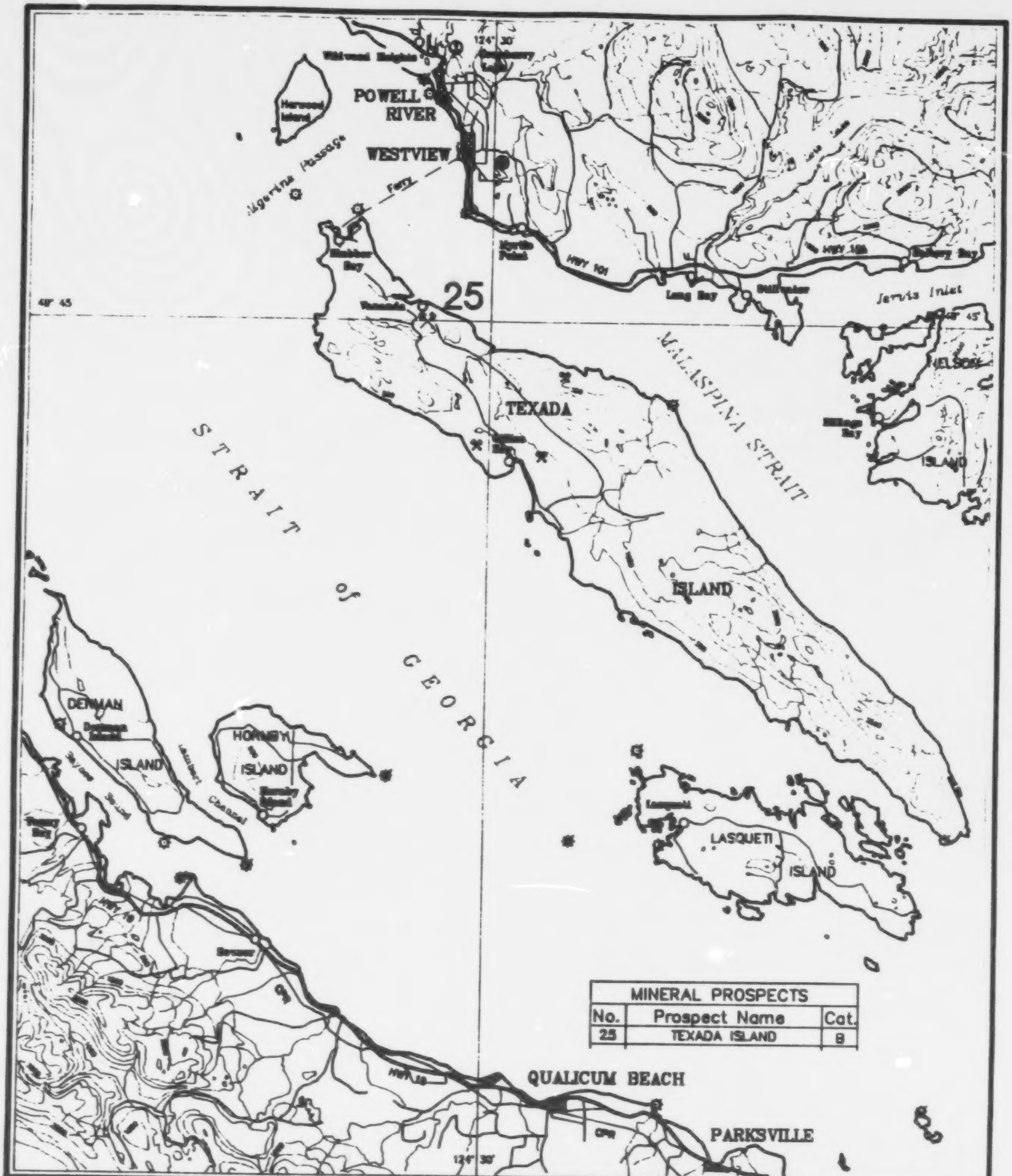
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000	DATE: MARCH 1986
S. GARDINER	FIGURE: I-L5


Wildwood Heights
124° 30'
Cranberry Lake
POWELL RIVER
Harwood Island
WESTVIEW
Algerine Passage
Ferry
Blubber Bay
Myrtle Point
HWY 101
HWY 101
Saltery Bay
Lang Bay
Stillwater
Jervis Inlet
49° 45'
Vananda
25
49° 45'
MALASPINA STRAIT
NELSON
TEXADA
Gillies Bay
ISLAND
ISLAND
STRAIT of GEORGIA
DENMAN
Denman Island
ISLAND
Baynes Sound
Lambert Channel
HORNBY
ISLAND
Hornby Island
Fanny Bay
Lasqueti
LASQUETI
ISLAND
HWY 19
Bowser
HWY 19
QUALICUM BEACH
CPR
PARKSVILLE
124° 30'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
25	TEXADA ISLAND	B

NOTES:

Contour interval 500 feet

Drawn by
INTEGRAL ENGINEERING, Vancouver, B.C.

N.T.S. 92F

5 MILES 0 5

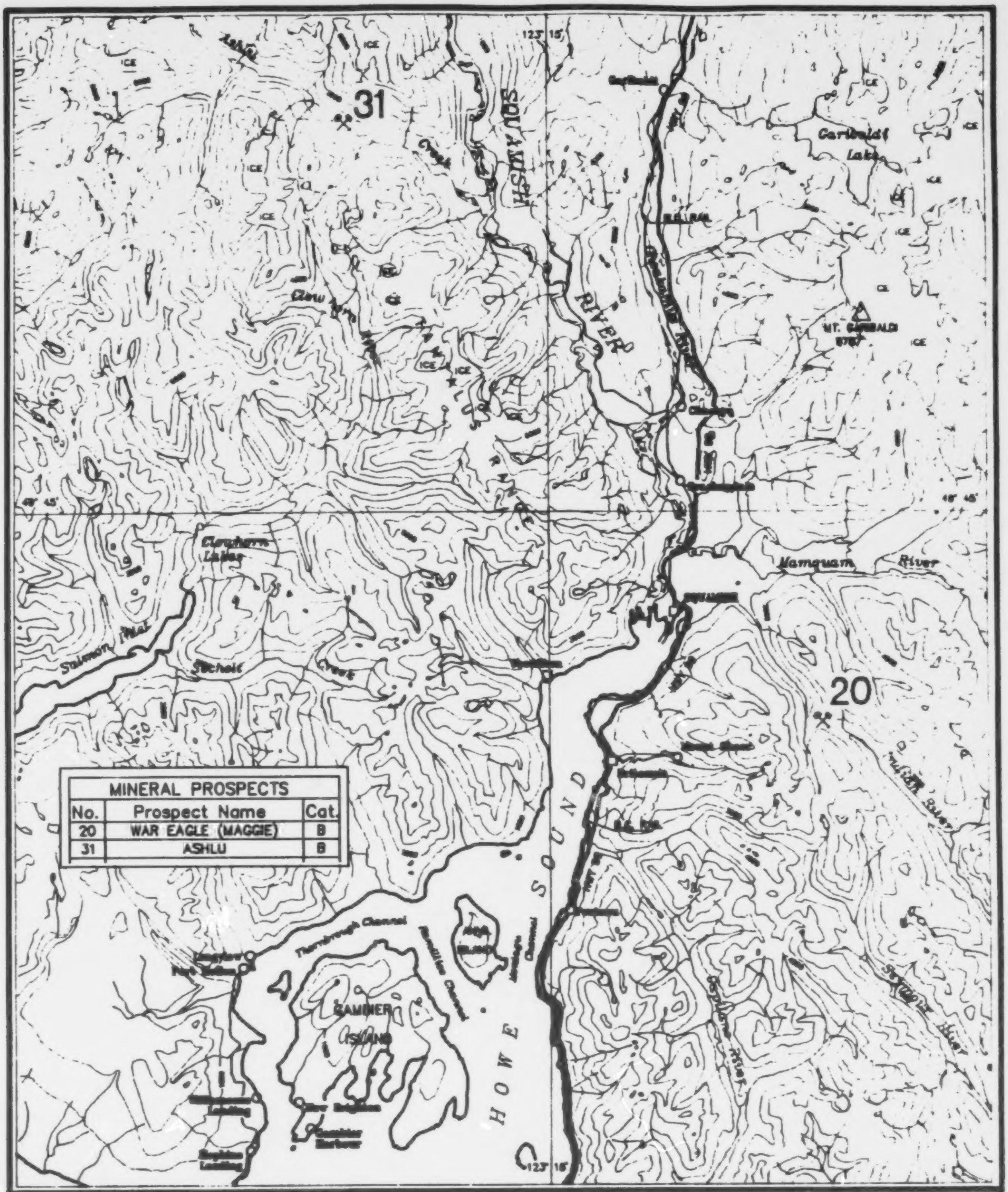
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000	DATE: MARCH 1986
S. GARDINER	FIGURE: I-L6


Ashlu
31
ICE
SQUAMISH
RIVER
Creek
Garibaldi Lake
MT. GARIBALDI 8787
123° 15'
49° 45'
Mamquam River
Clowhom Lakes
Salmon Inlet
Sechelt Creek
20
HOWE SOUND
Thornbrough Channel
GAMBIER ISLAND
Langdale
Port Mellon
Gambier Harbour
123° 15'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
20	WAR EAGLE (MAGGIE)	B
31	ASHLU	B

NOTES:
Contour interval 1000 feet

Drawn by:
INTERPEX ENGINEERING, Vancouver, B.C.

N.T.S. 92G

5 MILES 0 5

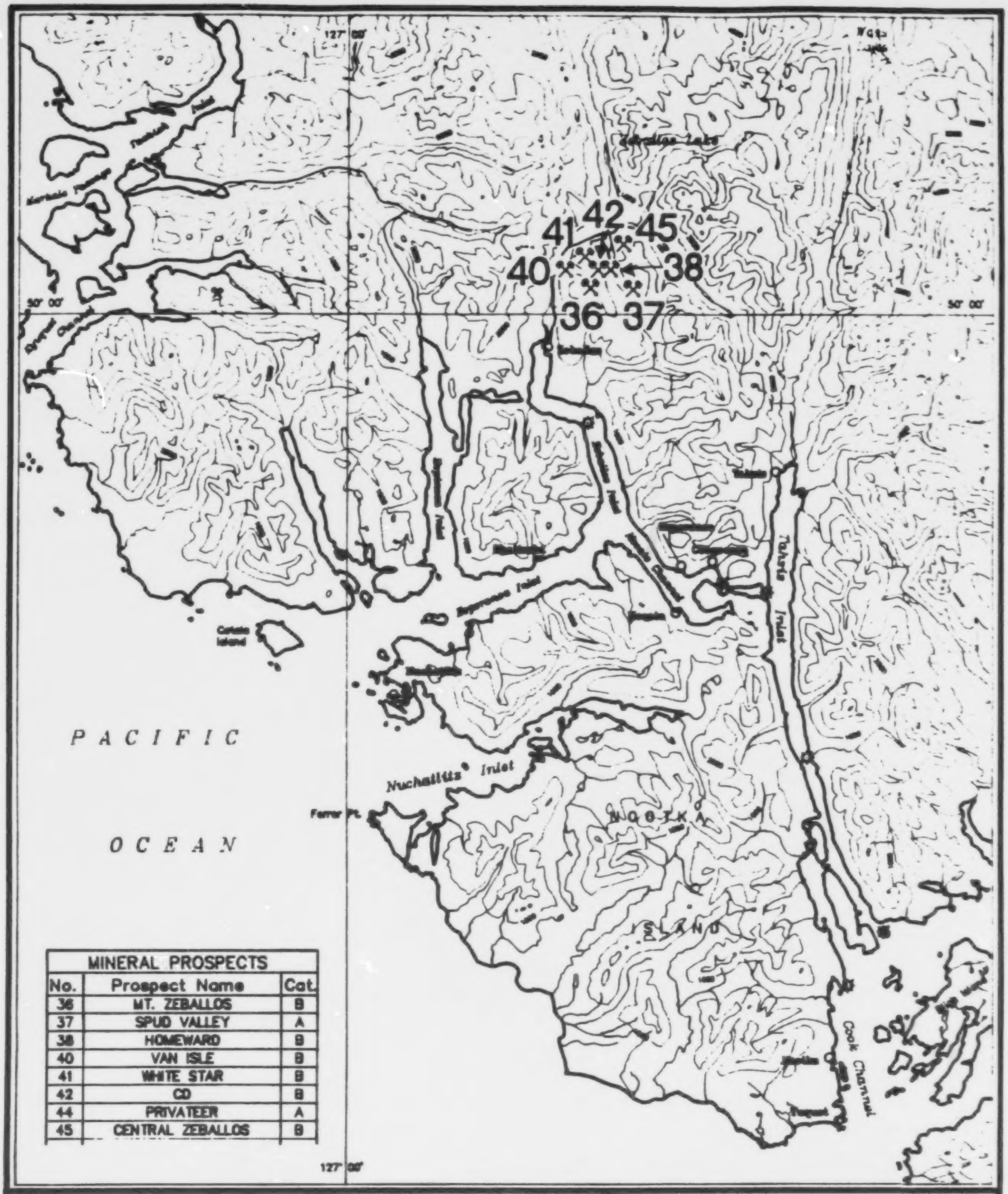
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000
DATE: MARCH 1986
S. GARDINER
FIGURE: I-L7


127° 00'
Zeballos Lake
41
42
45
40
38
36
37
50° 00'
50° 00'
Tahsis Inlet
Catala Island
PACIFIC
OCEAN
Nuchatlitz Inlet
Ferrer Pt.
NOOTKA
ISLAND
Cook Channel
127° 00'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
36	MT. ZEBALLOS	B
37	SPUD VALLEY	A
38	HOMEWARD	B
40	VAN ISLE	B
41	WHITE STAR	B
42	CD	B
44	PRIVATEER	A
45	CENTRAL ZEBALLOS	B

NOTES:
Contour interval 1000 feet

Drawn by:
INTEGREX ENGINEERING, Vancouver, B.C.

N.T.S. 92E, 92L

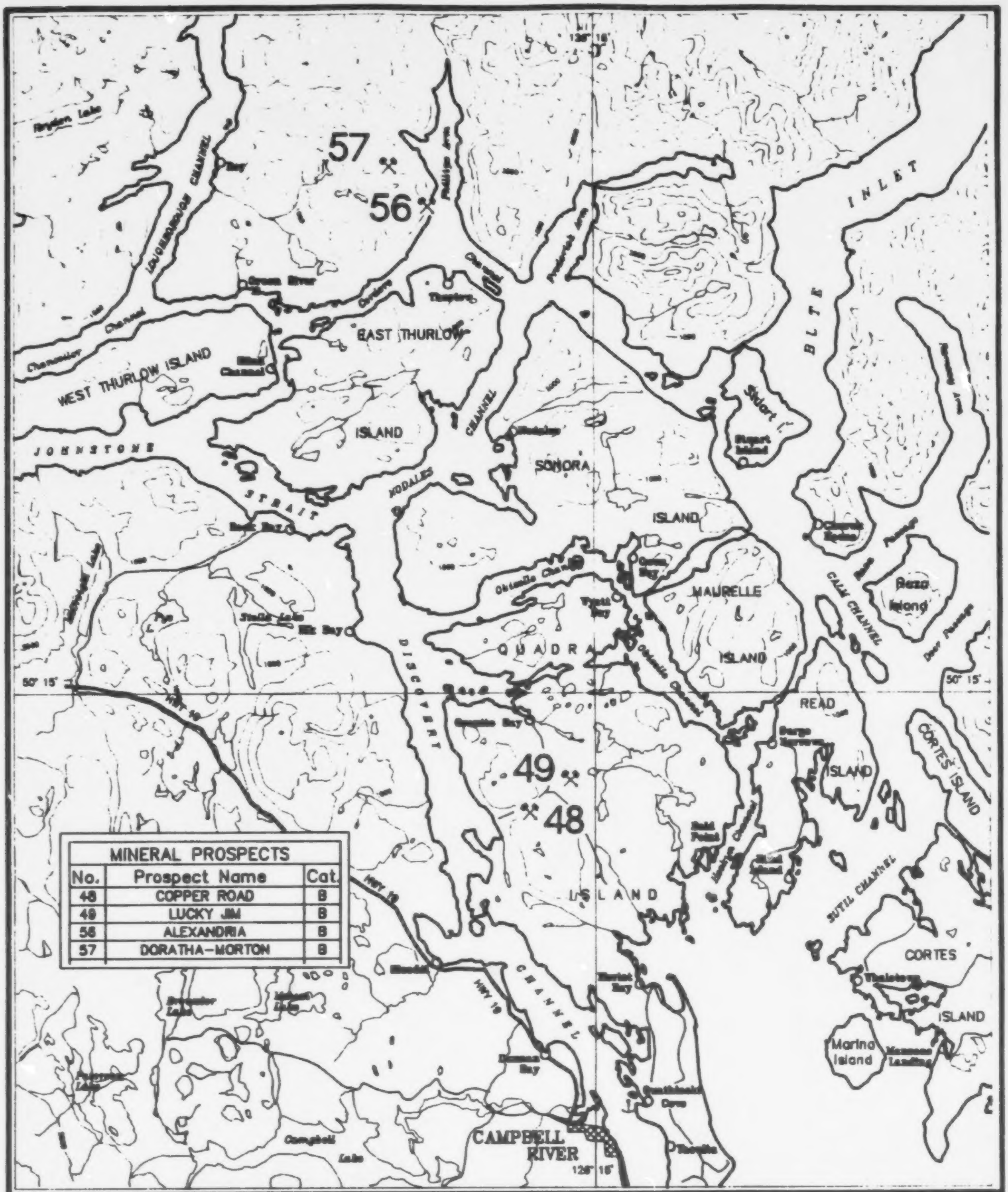
5 MILES 0 5
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000	DATE: MARCH 1986
S. GARDINER	FIGURE: 1-LB


57
56
48
49
126° 15'
50° 15'
WEST THURLOW ISLAND
EAST THURLOW
ISLAND
JOHNSTONE STRAIT
LOUGHBOROUGH CHANNEL
Chancellor Channel
Green River
Blind Channel
Thurlow
Phillips Arm
Frederick Arm
Cordero
NODALES
CHANNEL
SONORA
ISLAND
Stuart I.
Stuart Island
BUTE INLET
CALM CHANNEL
MAURELLE
ISLAND
QUADRA
ISLAND
Okisollo Channel
Owen Bay
Evans Bay
Raza Island
READ
ISLAND
CORTES ISLAND
CORTES
ISLAND
Marina Island
Mansons Landing
Whaletown
SUTIL CHANNEL
DISCOVERY
CHANNEL
Kelsey Bay
Sayward
Elk Bay
Granite Bay
Heriot Bay
Quathiaski Cove
Bold Point
Surge Narrows
HWY 19
Brewster Lake
Campbell Lake
Duncan Bay
CAMPBELL RIVER
Tsolum
1000

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
48	COPPER ROAD	B
49	LUCKY JIM	B
56	ALEXANDRIA	B
57	DORATHA-MORTON	B

NOTES:
Contour interval 1000 feet

Drawn by:
INTEGREX ENGINEERING, Vancouver, B.C.

N.T.S. 92K

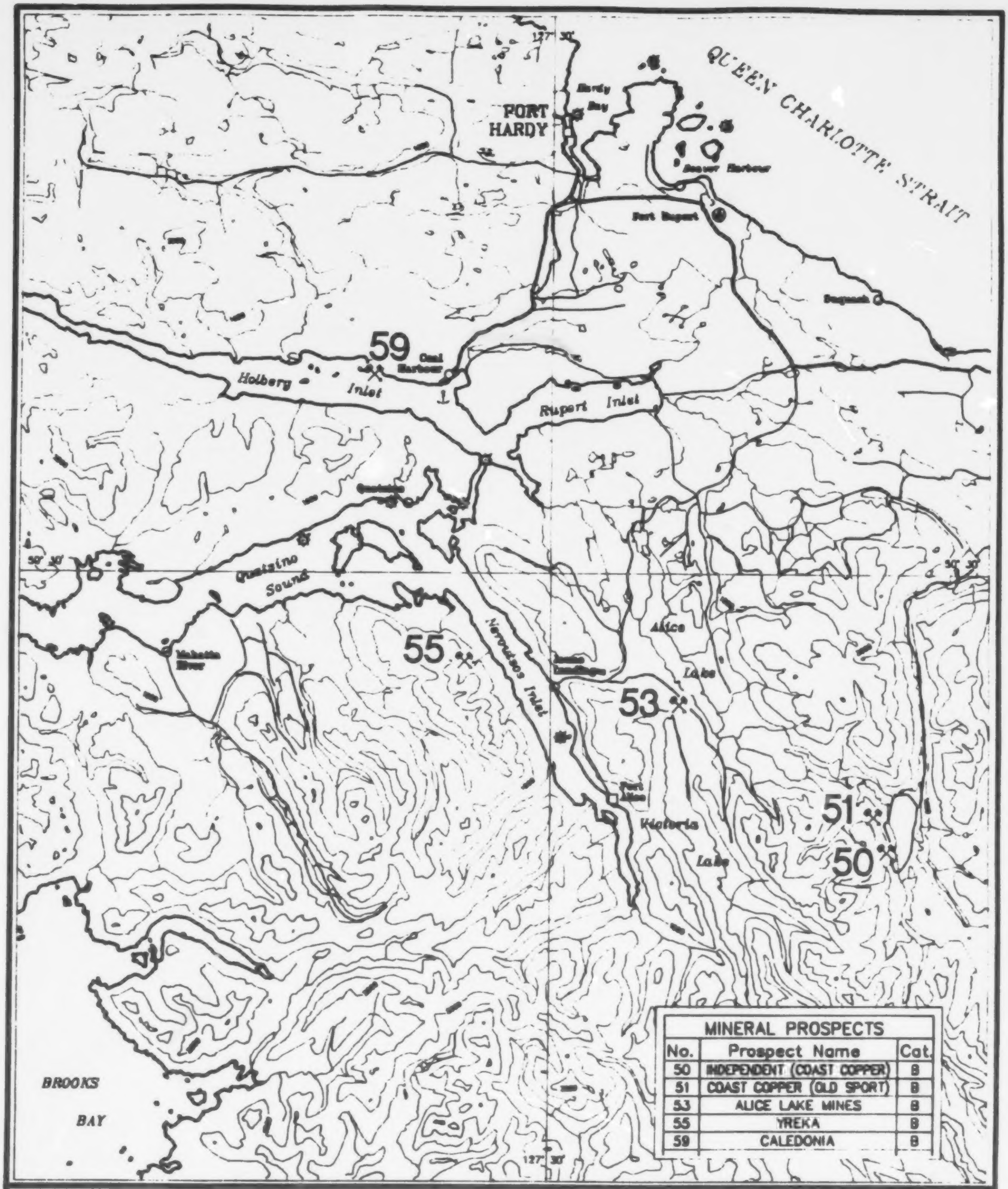
5 MILES 0 5
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000	DATE: MARCH 1986
S. GARDINER	FIGURE: I-L9


127° 30'
PORT HARDY
Hardy Bay
QUEEN CHARLOTTE STRAIT
Beaver Harbour
Fort Rupert
Suquash
59
Coal Harbour
Holberg Inlet
Rupert Inlet
Quatsino
50° 30'
Quatsino Sound
Mahatta River
55
Neroutsos Inlet
Jeune Landing
Alice Lake
53
Port Alice
Victoria Lake
51
50
BROOKS BAY
127° 30'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
50	INDEPENDENT (COAST COPPER)	B
51	COAST COPPER (OLD SPORT)	B
53	ALICE LAKE MINES	B
55	YREKA	B
59	CALEDONIA	B

NOTES:

Contour interval 1000 feet

Drawn by:
INTEGREX ENGINEERING, Vancouver, B.C.

N.T.S. 92L

5 MILES 0 5

5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

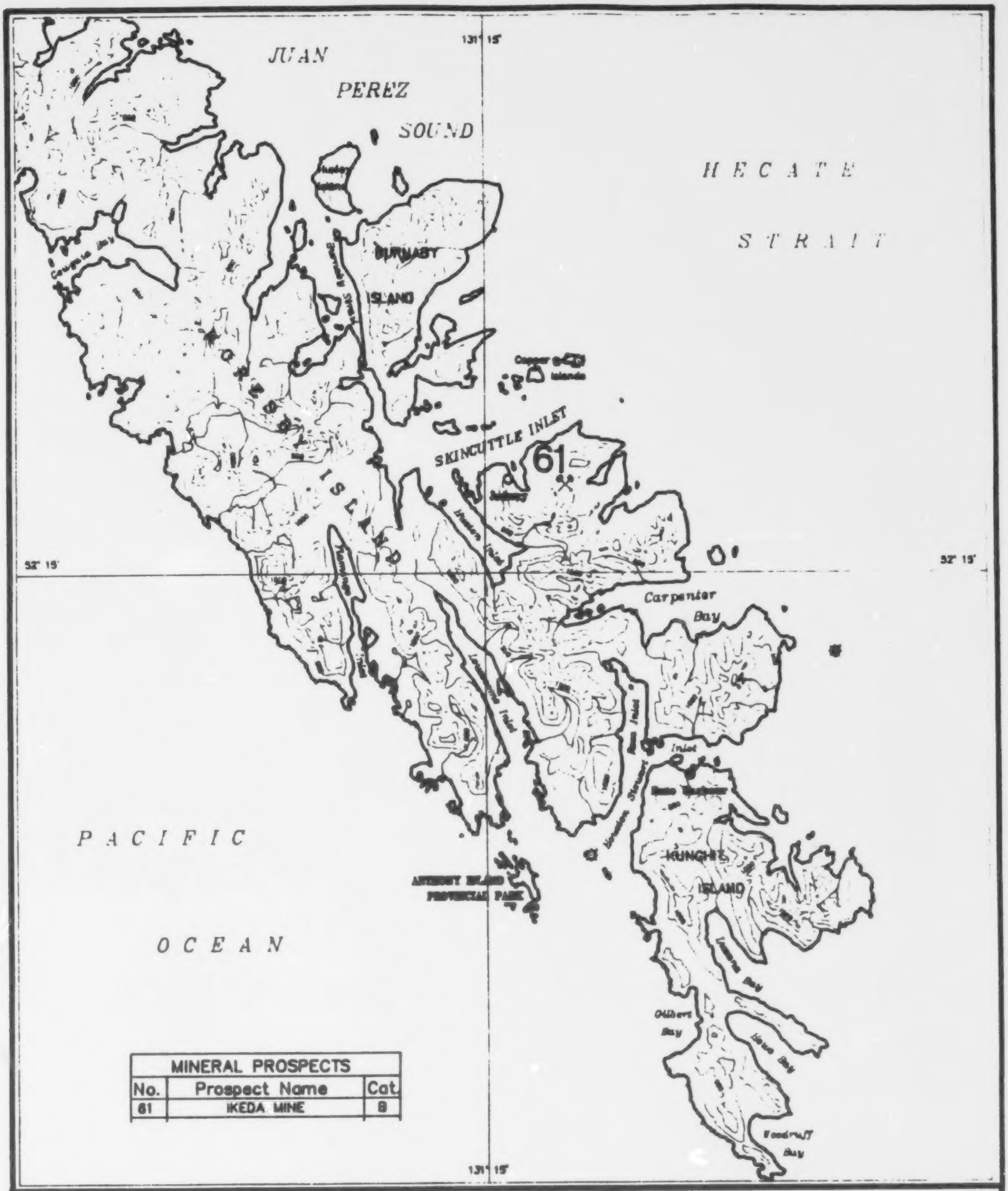
TRM ENGINEERING LTD.

SCALE: 1:300,000

DATE: MARCH 1986

S. GARDINER

FIGURE: I-L10


131° 15'
JUAN
PEREZ
SOUND
HECATE
STRAIT
BURNABY
ISLAND
Copper Islands
SKINCUTTLE INLET
61
MORESBY ISLAND
52° 15'
52° 15'
Carpenter
Bay
Inlet
KUNGHIT
ISLAND
ANTHONY ISLAND
PROVINCIAL PARK
PACIFIC
OCEAN
Gilbert
Bay
Bay
Bay
Woodruff
Bay
131° 15'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
61	IKEDA MINE	B

NOTES:
Contour interval 500 feet

Drawn by:
INTEGNEX ENGINEERING, Vancouver, B.C.

N.T.S. 103B

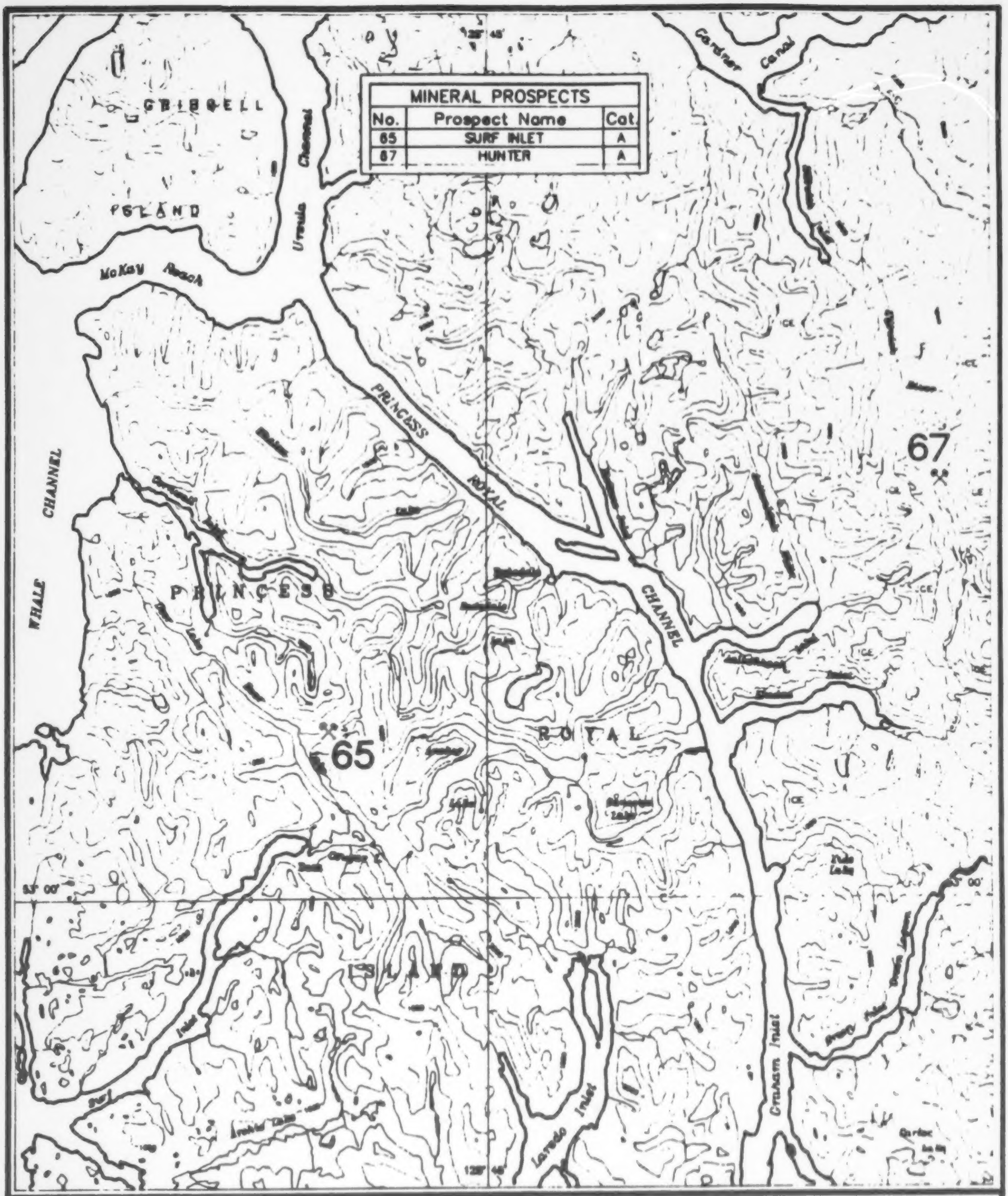
5 MILES 0 5
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000	DATE: MARCH 1986
S. GARDINER	FIGURE: I-L11


GRIBBELL
ISLAND
Ursula Channel
McKay Reach
Gardner Canal
PRINCESS ROYAL
WHALE CHANNEL
CHANNEL
PRINCESS
ROYAL
ISLAND
Laredo Inlet
Surf Inlet
Chapple Inlet
Pike Lake
Doig Inlet
Surf
Ice
53° 00'
128° 45'
65
67

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
65	SURF INLET	A
67	HUNTER	A

NOTES:
Contour interval 1000 feet

Drawn by
INTEGREX ENGINEERING, Vancouver, B.C.

N.T.S. 103A, 103H

5 MILES 0 5

5 KILOMETRES 5

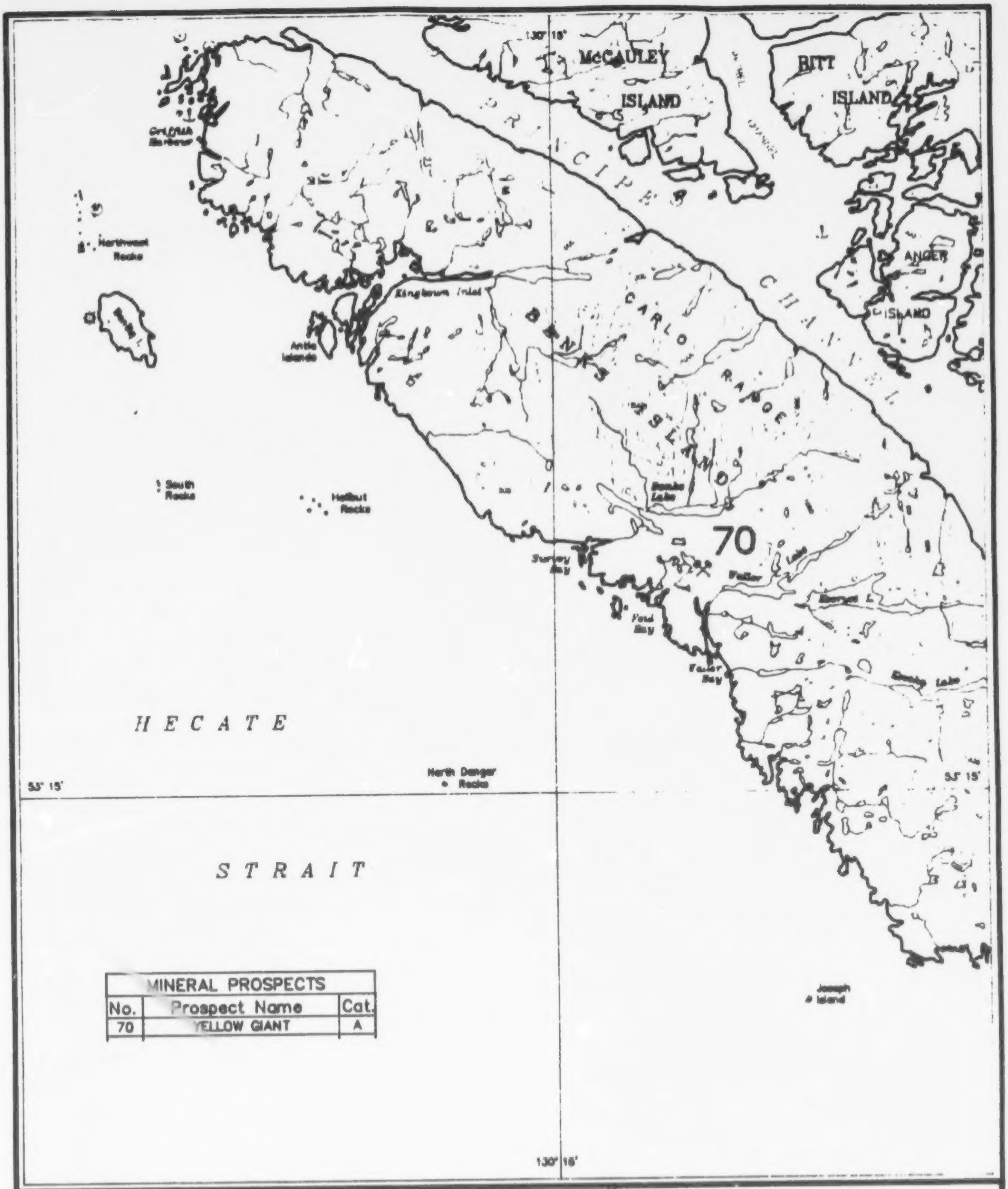
RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000
S. GARDINER

DATE: MARCH 1986
FIGURE: I-L12


130° 15'
McCAULEY
ISLAND
PITT
ISLAND
PRINCIPE CHANNEL
ANGER
ISLAND
Griffith Harbour
Northwest Rocks
Kingstown Inlet
Antle Islands
CARLO RANGE
BANKS ISLAND
Lake
South Rocks
Halibut Rocks
70
Survey Bay
Waller
Ford Bay
Lake
Foster Bay
Lake
HECATE
STRAIT
North Danger Rocks
53° 15'
53° 15'
Joseph Island
130° 16'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
70	YELLOW GIANT	A

NOTES:

Contour interval 500 feet

Drawn by
INTERREX ENGINEERING, Vancouver, B.C.

N.T.S. 103G, 103H

5 MILES 0 5

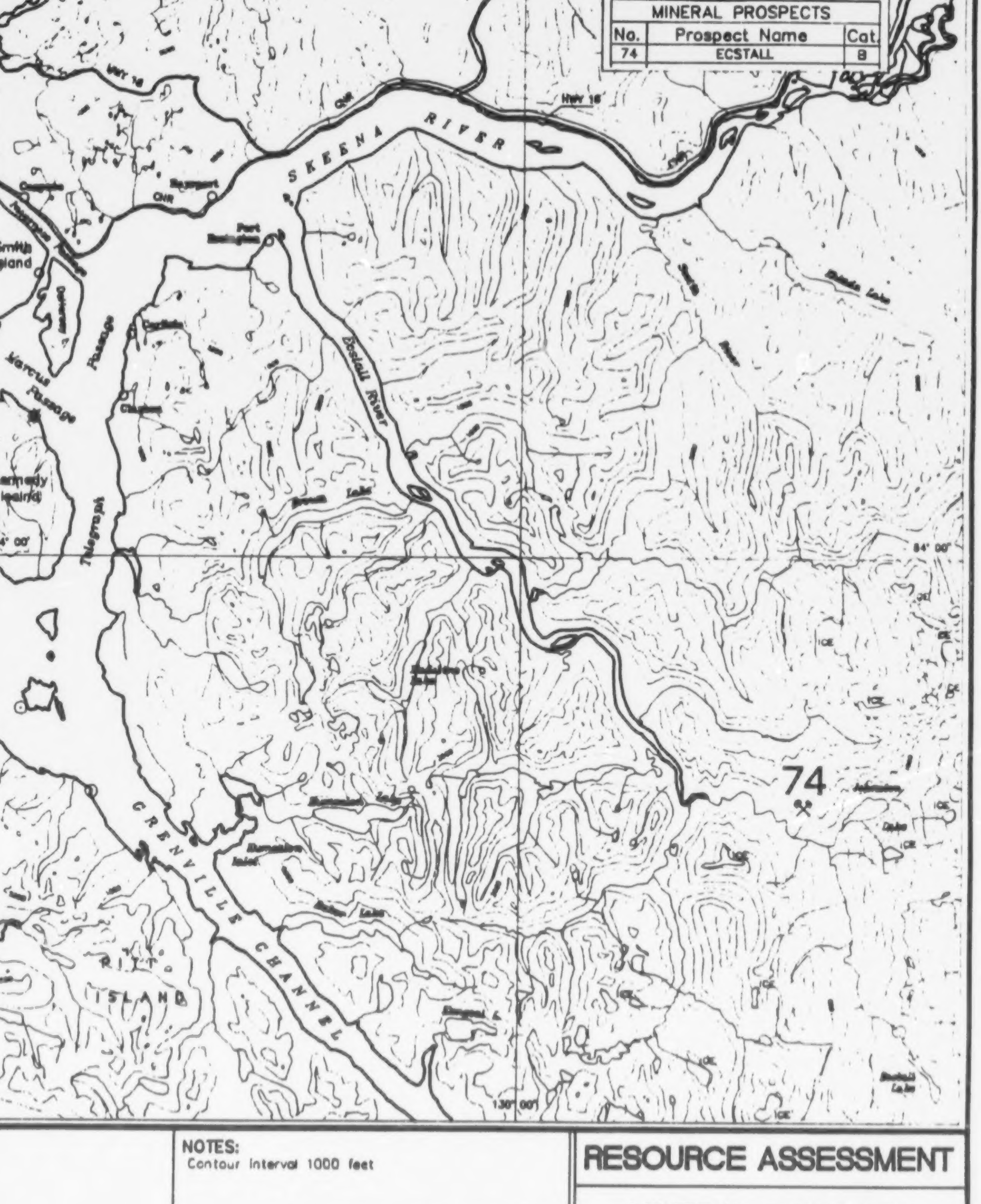
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000	DATE: MARCH 1986
S. GARDINER	FIGURE: I–L13


130° 00'
HWY 16
CNR
SKEENA RIVER
Smith Island
Marcus Passage
Passage
Kennedy Island
Telegraph
54° 00'
Port Essington
Ecstall River
GRENVILLE CHANNEL
PITT ISLAND
74
ICE

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
74	ECSTALL	B

NOTES:
Contour interval 1000 feet

Drawn by INTEGRAX ENGINEERING, Vancouver, B.C.

N.T.S. 103G,H,I,J

5 MILES 0 5

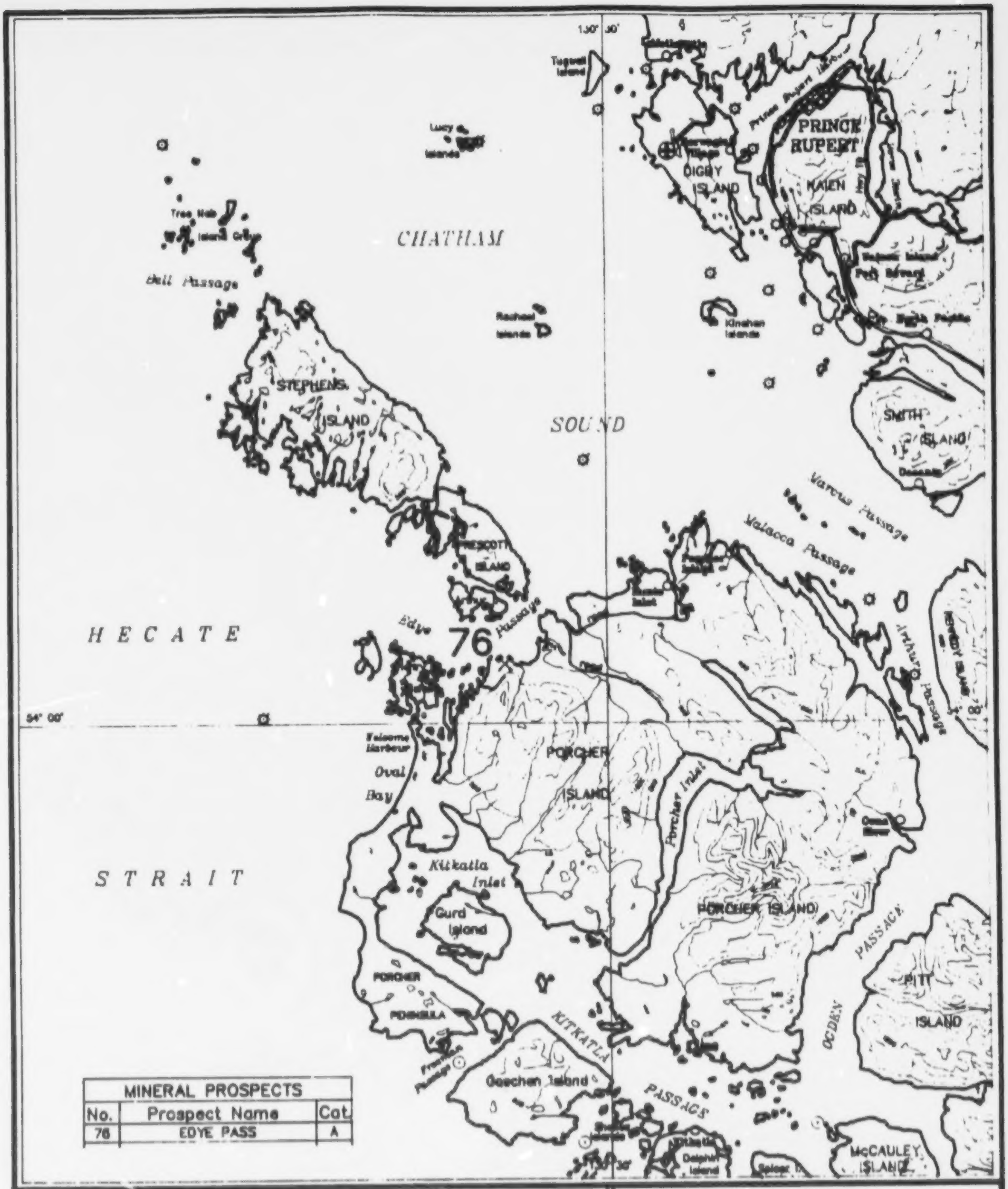
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000
DATE: MARCH 1986
S. GARDINER
FIGURE: I-L14


130° 30'
Tugwell Island
Lucy Islands
Tree Nob Island Group
Bell Passage
CHATHAM
SOUND
PRINCE RUPERT
DIGBY ISLAND
KAIEN ISLAND
Port Edward
Rachael Islands
Kinahan Islands
STEPHENS ISLAND
SMITH ISLAND
Marcus Passage
Malacca Passage
PRESCOTT ISLAND
Edye Passage
76
HECATE
STRAIT
54° 00'
Welcome Harbour
Oval Bay
PORCHER ISLAND
Porcher Inlet
Arthur Passage
KENNEDY ISLAND
Kitkatla Inlet
Gurd Island
PORCHER PENINSULA
KITKATLA PASSAGE
Goschen Island
Dolphin Island
OGDEN PASSAGE
PITT ISLAND
McCAULEY ISLAND

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
76	EDYE PASS	A

NOTES:

Contour Interval 500 feet

Drawn by:
INTERREX ENGINEERING, Vancouver, B.C.

N.T.S. 103G, 103J

5 MILES 0 5

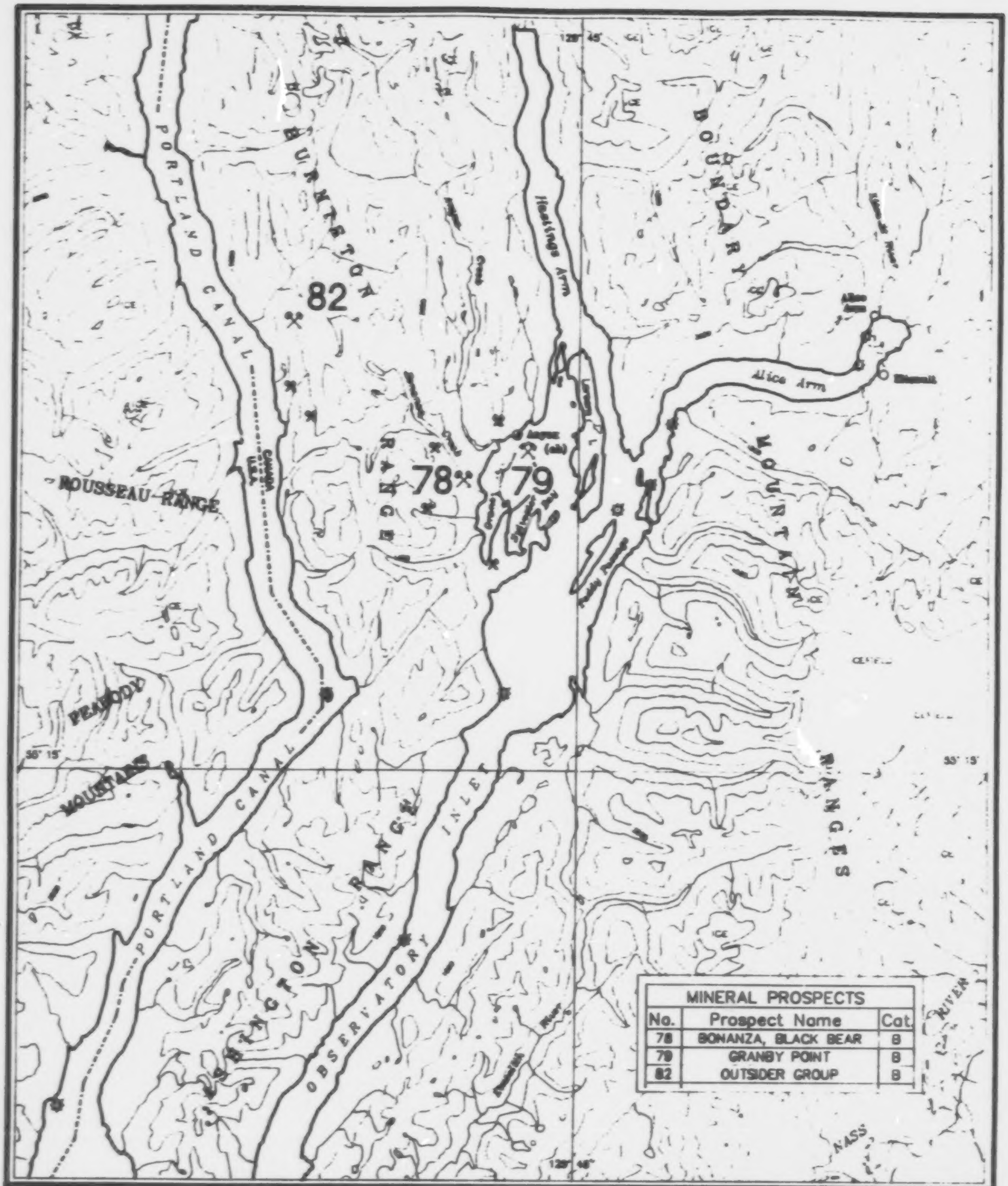
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000	DATE: MARCH 1986
S. GARDINER	FIGURE: I-L15


129° 45'
BOUNDARY
PORTLAND CANAL
BURNISTON
Hastings Arm
Alice Arm
Kitsault
82
78
79
Anyox
RANGE
ROUSSEAU RANGE
PEABODY
MOUNTAINS
55° 15'
55° 15'
MOUNTAIN
RANGES
PORTLAND CANAL
BURNISTON RANGE
OBSERVATORY INLET
ICE
NASS RIVER
129° 45'

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
78	BONANZA, BLACK BEAR	B
79	GRANBY POINT	B
82	OUTSIDER GROUP	B

NOTES:

Contour interval 1500 feet

Drawn by [illegible] ENGINEERING, Vancouver, B.C.

N.T.S. 103P, 103O

5 MILES 0 5

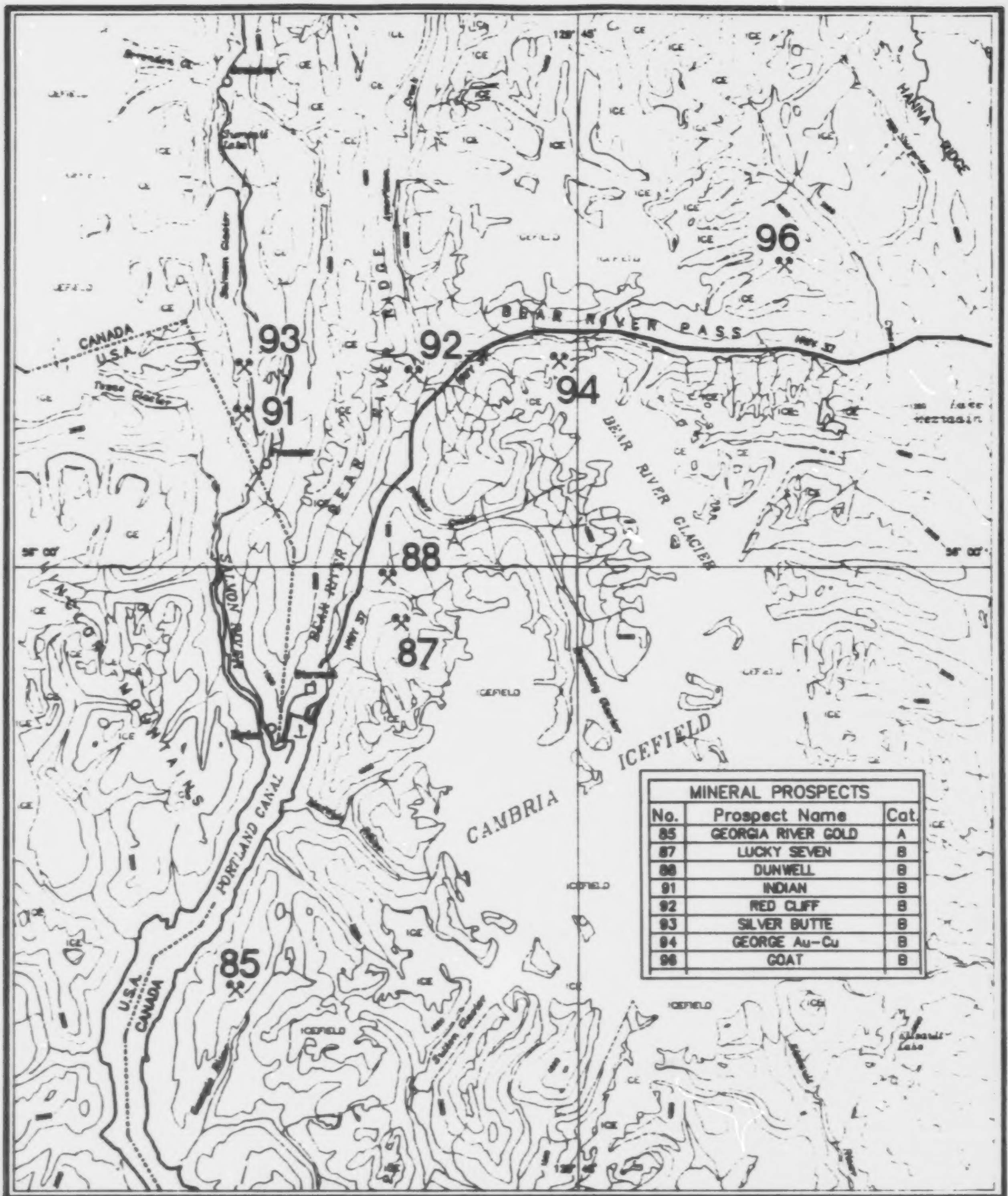
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000	DATE: MARCH 1986
S. GARDINER	FIGURE: I-L18


129° 45'
HANNA RIDGE
96
BEAR RIVER PASS
Hwy 37
CANADA
U.S.A.
93
92
94
91
Texas Glacier
Salmon Glacier
Summit Lake
BEAR RIVER RIDGE
BEAR RIVER GLACIER
56° 00'
88
87
BEAR RIVER
SALMON RIVER
ICEFIELD
CAMBRIA ICEFIELD
PORTLAND CANAL
U.S.A.
CANADA
85
ICE

MINERAL PROSPECTS		
No.	Prospect Name	Cat.
85	GEORGIA RIVER GOLD	A
87	LUCKY SEVEN	B
88	DUNWELL	B
91	INDIAN	B
92	RED CLIFF	B
93	SILVER BUTTE	B
94	GEORGE Au-Cu	B
96	GOAT	B

NOTES:
Contour interval 1500 feet

Drawn by
[illegible] ENGINEERING, Vancouver, B.C.

N.T.S. 103O,P 104A,B

5 MILES 0 5
5 KILOMETRES 5

RESOURCE ASSESSMENT

MINERAL DEPOSITS

TRM ENGINEERING LTD.

SCALE: 1:300,000
DATE: MARCH 1986
S. GARDINER
FIGURE: I-L17

APPENDIX D

APPENDIX D

COMMENTS ON INTERVIEW/DATA SHEET

2(a) NTS:

1(a) NAME:

2(b) LOCATION: Latitude: 1(b) OWNER/OPERATOR:
Longitude:

3. ACCESS: 4. CLAIM: Number:
Names:

5. ENVIRONMENT: Atmospheric Meteorological Station
Temp
Precip
Frost Free Days

Physiographic 2(c) Elevation:

Topography
Soils
Hydrology

6. HISTORY:

7. GEOLOGY: Mineralogy
Description

8. RESERVES:

9. MINING TYPE:

10. EXPLORATION POTENTIAL:

11. METALLURGICAL DATA:

1(a)-(b) NAME/OWNER

This information was derived from Mining Review Magazine, Mineral Exploration Review (BC EMPR periodical), MINFILE, Canadian Mineral Deposits Not Being Mined in 1980 (MRI 80/7), Mercury in the Canadian Environment (EPS3-EC-79-6), TRM Engineering files (includes news releases, industry periodicals and assessment reports), Canadian Mines Handbook, BC EMPR geologists and industry contacts.

2(a)-(c) NTS #, LOCATION, ELEVATION

The data was collected mainly from MINFILE. Elevations are included on data sheets for Categories A and B.

3(a)-(b) ACCESS

This information was derived from topographic maps, assessment reports and industry personnel. The information was compiled for Categories A and B.

4 CLAIM STATUS

Claims information was requested but since the interviews were usually by telephone limited information was gained.

5 ENVIRONMENT

A few comments were received from industry representatives but the information was taken primarily from government publications (see reference list in Appendix D) and is included for Category A only.

6 HISTORY

A literature search usually preceded the interview with industry personnel. This information was updated during the interview. Additional sources of information, if given, were followed up as much as time permitted.

7 GEOLOGY, MINERALOGY

The information was gained from same sources as in Section 1 (above), plus the GSA Field Trip Guide (1985). During the interview, the industry representatives were asked if the information from the literature was accurate and revisions were made when necessary. Additional data on mineralogy was acquired from metallurgical reports.

8 RESERVES

The contact was asked to verify reserve estimates that had been compiled from the literature. If no reserve information had been published, the contact was asked for an estimate and that figure has been presented.

9 MINING TYPE

Comments made on mining type were of a general nature. Much of the information has been derived from the production history or assessment reports where a projection of a possible mining situation has been made.

10 EXPLORATION POTENTIAL

A comment on exploration potential was requested. All properties were described as "exploration prospects" or as having moderate to good exploration potential.

11 METALLURGICAL DATA

The contact was asked if any recent metallurgical testing had been done. A comment on the mineral processing techniques that would be required for treatment of ore on the property was requested. Documentation, in the form of written reports on metallurgical testing, were acquired whenever possible. Published reports were also compiled and reviewed.

APPENDIX E

APPENDIX E
REFERENCE INFORMATION AND STATISTICS

INDEX #	NAME	NTS #	MINFILE #	CATEGORY	MINING TYPE	METALLURGICAL INFORMATION	OWNER/OPERATOR CONSULTANT	REFERENCES
1	Sunro Mine	92C 8E	92C 073	B	UG(H)	N	Unknown	Ref. #4, 12
2	Valentine Mt.	92B 12W	92B 108	D	UK	N	Falconbridge Ltd.	Ref. #3b pers. comm.
3	Mount Sicker	92B 13W	92B 001, 002,003, 031	B	UG(H)	N	Corp. Falc. Copper	BCDM Annual Reports, 1898 to 1951 Ref. # 3b, 4 pers. comm.
4	Lara	92B 13W	92B 110	D	UK	N	Abermin Corp.	Ref. #3a, 3b, 2 George Cross Newsletter, January 15, 1986 pers. comm.
5	Thistle	92F 2E	92F 083	B	UG(H)	N	Westmin Ltd.	Ref. #3a, 3b, 4
6	Lecra, Donald	92F 3W	92F 031	D	UG(H)	N	Discovery Gold Explorations Ltd.	Asmt. Rpt. 7665 Ref. #4
7	Rosemarie	92F 3W	92F 032	D	UK	L	Unknown	Ref. #4, 13
8	Victoria	92F 2E	92F 079	D	UK	N	Unknown	Asmt. Rpt. 4915, 6153 Ref. #4
9	Kallapa	92F 4W	92F 077	B	UK	N	Unknown	Ref. #4
10	Pandora	92F 4E	92F 040	A	UG(H)	N	New Privateer Mines Ltd.	Ref. #1, 4, 6, 7a, 7b, 9, 38 pers. comm.
11	Agassiz-Weaver	92H 5W	92HSW083	C	BULK(R)	N	Int. Curator Resources	Ref. #3a, 3b, 4
12	RN Mine	92H 5E	92HSE139	D	UK	L	Abo Oil Kerr Addison Mines	Ref. #3b, 7a, 7b, 11 pers. comm.

APPENDIX E
REFERENCE INFORMATION AND STATISTICS

INDEX #	NAME	NTS #	MINFILE #	CATEGORY	MINING TYPE	METALLURGICAL INFORMATION	OWNER/OPERATOR CONSULTANT	REFERENCES
13	Aufeas	92H 6W	92HSW036	D	UG(H)	L	Silver Cloud Mines	BCDM Ann. Rpt., 1911-1915, 1937-1942 pers. comm.
14	Prosper	92F 5E	92F 053	D	UG(H)	N	Tamara Resources (OP)	Asmt. Rpt. 5506, 3329 Ref. #4
15	Herbert Inlet	92F 5W	92F 022	D	UG(H)	Y	G. Kinar (Own) Consort Energy	BCDM Ann. Rpt. 1938 Ref. #3, 36 The Miner, 1936, Report on Berton Gold Mines
16	Indian Chief	92E 8W	92E 011	C	OP	N	Unknown	Ref. #4, 12
17	Copper Bay	92G 11W	92GNW925	C	OP	N	Unknown	Ref. #4
18	Britannia	92G 11E	92GNW003	C	UG(H)	N	Copper Beach Estates	Ref. #4
19	Danzig	92E 9W	92E 017, 026	B	UG(H) OP(?)	N	Unknown	Ref. #4, 12
20	War Eagle	92G 11E	92GNW042	B	UG	Y	Int. Maggie Mines	Ref. #4 pers. comm.
21	Doctors Point	92H 12W	92H 071	B	OP	L	Rhyolite Res./ Heritage Pet. (Own)	Ref. #7a, 7b, 11 pers. comm.
22	King Midas	92F 9E	92F 019	D	UK	N	Unknown	BC EMPR Mineral Deposit - Land Use Map 92F Ref. #4
23	Cambrian Chieftan	92G 12W	92GNW011	D	UK	N	Unknown	Ref. #4
24	Holly	92F 15E	Unknown	C	UK	N	Northair, prospectors	Ref. #3b

APPENDIX E
REFERENCE INFORMATION AND STATISTICS

INDEX #	NAME	MTS #	MINFILE #	CATEGORY	MINING TYPE	METALLURGICAL INFORMATION	OWNER/OPERATOR CONSULTANT	REFERENCES
25	Texada Island	92F 10E, 15E	92F 002, 077, 105, 112, 258, 270	B	UG(H)	Y	S. Beale (OP)	BCDM Ann. Rpt. 1913-1918 Ref. #4, 14, 24 pers. comm.
26	Marjorie, Bolivar	92F 15E	92F 109, 364	D	UG(H)	L	Rhyolite Res., Heritage Pet.	Asmt. Rpt. #6845, 5693, 5645, 5019 Ref. #4, 13 pers. comm.
27	Mt. Washington Gold	92F 11, 14	92F 117	D	UK	N	Better Resources	Ref. #3b, 7a, 7b pers. comm.
28	Mt. Washington Copper	92F 14W	92F 117	C	OP(H)	N	Unknown	Ref. #4
29	Skookum (Chalice)	92F 16E 92G 13W	92GNW008	D	UK	L	Chalice Mining Co.	Asmt. Rpt. 2722 Ref. #4 pers. comm.
30	Port Eliza Gold Mine	92E 14E	92E 043	D	UK	N	Unknown	BCDM Ann. Rpt. 1933 Ref. #4
31	Ashlu	92G 14W	92GNW013	B	UG(H)	Y	Tenquille Res., D. Bain (consultant)	BCDM Ann. Rpt. 1924-1933 Ref. #4, 8, 19 pers. comm.
32	Ice, Yalakum	92G 14W	92GNW047	D	UG, SCUT (H)	N	West-Mar Res.	BC EMPR GEM 1977, 1979 Ref. #4, 7a pers. comm.
33	Beano	92E 15W	92E 002	D	UG, SCUT (H)	N	Unknown	BCDM Ann. Rpt. 1938, 1947, 1948 Ref. #4
34	Tagore	92L 2W	92L 006	D	UG(H)	N	Unknown	BCDM Ann. Rpt. 1924-1947 Ref. #4, 31
35	Fil Mil	92L 3E	92L 003	D	UG(H)	L	Cal-Denver Res. Resources (OP) J. Franzen (consultant)	BCDM Ann. Rpt. 1946, 1947 Ref. #4 pers. comm.

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INDEX #	NAME	NTS #	MINFILE #	CATEGORY	MINING TYPE	METALLURGICAL INFORMATION	OWNER/OPERATOR CONSULTANT	REFERENCES
36	Mt. Z^ballos	92L 2W	92L 012	B	UG(H)	N	Unknown	BCDM Ann. Rpt. 1936-1942 Ref. #4, 31
37	Spud Valley	92L 2W	92L 013	A	UG(H)	Y	McAdam Resources	BCDM Ann. Rpt. 1936-1942 Ref. #1, 4, 6, 12, 31, 38, 39 pers. comm.
38	Homeward	92L 2W	92L 019	B	UG(H)	N	Unknown	BCDM Ann. Rpt. 1937-1940 Ref. #4, 31, 13
39	Zeballos Pacific	92L 2W	92L 011	D	SCUT(H)	N	Unknown	BCDM Ann. Rpt. 1937, 1940 Ref. #4, 31, 30
40	Van Isle	92L 2W	92L 038	B	UG(H)	N	Unknown	BCDM Ann. Rpt. 1933-1940 Ref. #4, 31
41	White Star	92L 2W	92L 010	B	UG(H)	N	Unknown	BCDM Ann. Rpt. 1939-1942 Ref. #4, 31
42	C.D.	92L 2W	92L 015	B	UG(H)	N	Unknown	BCDM Ann. Rpt. 1936-1941 Ref. #4, 31
43	Rimy	92L 2W	92L 016	D	UG(H)	N	Unknown	BCDM Ann. Rpt. 1936, 1938 Ref. #4
44	Privateer	92L 2W	92L 008	A	UG(H)	Y	New Privateer Mines Ltd.	BCDM Ann. Rpt. 1934-1953 Ref. #1, 4, 6, 12, 23, 31, 37, 38 NA Gold Mining News, Feb. 7/86 pers. comm.
45	Central Zeballos	92L 2W	92L 018	B	UG(H)	N	Impact Resources	BCDM Ann. Rpt. 1936-1947 Ref. #4, 31
46	King Midas	92L 2W	92L 020	D	UG, SCUT (H)	N	Unknown	BCDM Ann. Rpt. 1934, 1938 Ref. #4
47	Warman (Northair)	92J 3E	92J 012	C	UG(H)	N	Northair Mines	Ref. #4

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48	Copper Road	92K 3W	92K 009, 060	B	UG(H)	N	Mrs. J. Adams, Mr. & Mrs. Eugene Adams	BC EMPR GEM 1969-1970 Ref. #4, 12
49	Lucky Jim	92K 3W	92K 015	B	UG(H)	N	Butler Mountain Minerals	Ref. #4, 7a, 34 pers. comm.
50	Independent (Coast Copper)	92L 8E	92L 091	B	UG?	N	Unknown	Ref. #4
51	Coast Copper (Old Sport)	92L 8E	92L 035	B	UG(H)	N	Unknown	Ref. #4, 12
52	Thurlow Gold	92K 6W	92K 018	D	UK	N	Unknown	Ref. #4
53	Alice Lake Mines	92L 6W	92L 057	B	UK	N	Alice Lake Mines	Ref. #4, 12
54	Douglas Pine	92K 6W	92K 035	D	UG(H)	N	Unknown	BCDM Ann. Rpt. 1940 Ref. #4
55	Yreka	92L 5E	92L 052	B	UK	N	Uke Resources	Asmt. Rpt. #4425, 3162, 3164 Ref. #4, 76
56	Alexandria	92K 6W, 11W	92K 028	B	UG(H)	N	Falconbridge Ltd. (OP) Charlemagne Res. (Own)	Ref. #4, 3b, 7b NA Gold Mining News, Aug. 16/85 pers. comm.
57	Doratha-Morton	92K 11W	92K 023	B	UG(H)	Y	Signet Resources	Ref. #4, 3b, 15 Company news releases pers. comm.
58	Colossus	92K 11E	92K 029	C	BULK(R)	N	R. MacDonald (New Jersey Zinc)	Asmt. Rpt. #317 Ref. #4, 12
59	Caledonia	92L 12E	92L 061	B	UK	N	Carnes Creek Exploration	Ref. #4, 12

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INDEX #	NAME	NTS #	MINFILE #	CATEGORY	MINING TYPE	METALLURGICAL INFORMATION	OWNER/OPERATOR CONSULTANT	REFERENCES
60	Silta	92L 14E	92L 178	D	UK	N	*Unknown*	*BC EMPR Mineral* Deposit - Land Use Map 92L Ref. #4
61	Ikeda Mine	103B 6E	103B-C028	B	UG(H)	N	Falconbridge Ltd. (OP)	Asmt. Rpt. #195 Ref. #4, 12, 3b, 32 pers. comm.
62	High Grade	103B 13W	103B 063	D	UK	N	Majorem Minerals	Ref. #3a, 3b pers. comm.
63	April	103B 12E	103B 064	D	UK	N	Placer Dev. (OP) JMT Services (Own)	Ref. #3a, 3b pers. comm.
64	Tasu	103B 12E	103B-C005	C	OP(H)	N	Unknown Westrob Mines (1973)	BC EMPR GEM 1973 Ref. #4
65	Surf Inlet	103H 2W	103H-G027	A	UG(H)	Y	Fleet Dev. Ltd.	BCDM Ann. Rpt. 1900-02, 1912-25, 1935-42 Ref. #1, 4, 6, 12, 17, 18, 38 pers. comm.
66	Western Copper	103H 1W	103H-G033	D	UG(H)	N	M. Meldrum (Own)	Ref. #4 pers. comm.
67	Hunter	103H 1W	103H-G034	A	SCUT, UG (H)	N	M. Meldrum (Own)	Ref. #1, 4, 6, 25, 27, 28, 35, 38 pers. comm.
68	Southeaster	103G 5W	103F-G006	D	UK	N	Unknown	Ref. #4
69	Ox	103H 7W	103H-G022	D	UG(H)	N	Unknown	Asmt. Rpt. #3347 BC EMPR GEM 1971, 1972 Ref. #4
70	Yellow Giant	103H 8E	103H-G039 3,6,38,67	A	UK	Y	Trader Resource Corp.	Ref. #4, 12, 22, 16, 29, 33 pers. comm.

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71	Smith-Nash	93E 5W	93E 014	D	UK	N	Cons. Silver Standard	Asmt. Rpt. 10747 Ref. #4, 12 pers. comm.
72	Cinola	103F 9E	103F-G034	C	OP(R)	N	Cons. Cinola Mines	Ref. #4, 5
73	Drumlummon	103H 14E	103H-G018	D	UG(H)	N	Unknown	BCDM Ann. Rpt. 1907-1925 Ref. #4
74	Ecstall	103H 13E, 14W	103H-G011	B	OP or UG?	N	Unknown	Ref. #4, 12
75	Inconspicuous	103F 13W	103F 043	D	UK	N	Majorem Minerals	Ref. #7a pers. comm.
76	Edye Pass	103J 2E	103I-J001, 002	A	UG(H)	Y	Imperial Metals	BCDM Ann. Rpt. 1935-1938 Ref. #1, 4, 6, 10, 12, 21, 35, 38 pers. comm.
77	Jitney	103J 1W	103I-J170	D	UK	N	Unknown	BC EMPR Mineral Deposit - Land Use Map 103J Ref. #4
78	Bonanza, Black Bear	103P 5W	103P 023	B	UG(H)	N	Cominco Ltd.	Ref. #4, 12 pers. comm.
79	Granby Point	103P 5W	103P 022	B	UG(H)	N	Unknown	Ref. #4
80	Maple Bay Group	103P 5W, 103O 8E	103P 029	D	UG(H)	N	F. Christensen	BCDM Ann. Rpt. 1902-1923 BC EMPR GEM 1969, 1970 Ref. #4, 12
81	Anyox, Hidden Creek	103P 5W	103P 021	C	UG(H)	N	Cominco Ltd.	Ref. #4, 5, 12 pers. comm.
82	Outsider Group	103O 8E	103P 030	B	UG(H)	N	Unknown Maple Bay Mines (1972)	BC EMPR GEM 1972 Ref. #4

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INDEX #	NAME	NTS #	MINFILE #	CATEGORY	MINING TYPE	METALLURGICAL INFORMATION	OWNER/OPERATOR CONSULTANT	REFERENCES
83	Esperanza	103P 6W	103P 126, 127	D	UK	N	Unknown	BC EMPR Mineral Deposit - Land Use Map 103P Ref. #4
84	Dolly Varden	103P 12E	103P 187, 188, 191	C	UG(H)	N	Dolly Varden Mines	Asmt. Rpt. #7098 BC EMPR GEM 1970 Ref. #12, 4
85	Georgia River Gold	103O 16E	103P 003	A	UG(H)	N	Samson Gold (Own) Imperial Metals Corp. (former OP)	BCDM Ann. Rpt. 1914-1918, 1928-1931 Asmt. Rpt. #8547 Ref. #1, 4, 6, 38 pers. comm.
86	Prosperity-Porter Idaho	103P 3W	103P 089	C	UG(H)	Y	Teck Corporation (OP) Pacific Cassiar Ltd. (Own?)	Ref. #4, 3a, 3b, 12, 20 pers. comm.
87	Lucky Seven	103P 13W	103P 068	B	UG(H)	N	Pacific Cassiar Ltd.	Ref. #4, 12 pers. comm.
88	Dunwell	103P 13W	103P 052, 054	B	UG(H)	N	Silver Princess Mines Ltd.	BCDM Ann. Rpt. 1913-1926 Ref. #4 pers. comm.
89	Woodbine	104B 1E	104B 090	D	UG(H)	N	Esso Resources Ltd.	Ref. #4, 3a, 3b pers. comm.
90	Silbak-Premier	104B 1E	104B 054	C	UG(H) BULK(R)	Y	Westmin	Ref. #3a, 3b, 4, 5, 26 pers. comm.
91	Indian	104B 1E	104B 031	B	UG(H)	N	Esso Resources Ltd.	BCDM Ann. Rpt. 1924, 1925 Ref. #3a, 3b pers. comm.
92	Red Cliff	104A 4W	104A 036, 037	B	UG(H)	N	Unknown	BC EMPR GEM 1973 Ref. #4

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INDEX #	NAME	NTS #	MINFILE #	CATEGORY	MINING TYPE	METALLURGICAL INFORMATION	OWNER/OPERATOR CONSULTANT	REFERENCES
93	Silver Butte	104B 1E	Unknown	B	UK	N	Tenaton Silver Corp. Esso Resources Ltd. (former operator)	Asmt. Rpt. #9960 Ref. #3b pers. comm.
94	George Gold-Copper	104A 4E	104A 028, 029	B	UK	N	Tournigan Mining Explorations Ltd.	Asmt. Rpt. #6832 Ref. #4, 12 pers. comm.
95	Big Missouri	104B 1E	104B 046	C	UG(H) BULK(R)	N	Westmin	Ref. #3a, 3b, 4, 5, 12 pers. comm.
96	Goat	104A 1E	104A 003	B	UG	N	Nor'Quest Res.	Ref. #4, 24 pers. comm.
97	Troy	104B 1E	104B 035	D	UG(H)	N	Unknown	Ref. #4
98	Granduc	104B 1W	104B 021	C	UG(H)	N	Unknown	Ref. #4
99	Scottie Gold	104B 1E	104B 074	C	UG	N	Scottie Gold Mines	Ref. #4, 5, 24 pers. comm.
100	East Gold	104B 8E	104B 033	D	UK	N	A. Souci	Ref. #4

MINING METHODS
SCUT - surface cut
UG - underground
OP - open pit
BULK - bulk type - type not specified
UK - unknown
(H) - indicates historical, type of mining used in the past
(R) - indicates a more recent evaluation - currently used or planned to be used

METALLURGICAL INFORMATION COLLECTED
Y - yes - reports are listed in the References
N - no
L - limited - results are listed in the exploration history for the deposit

MINING INDUSTRY REPRESENTATIVE CONTACTED - OWNER/OPERATOR/CONSULTANT
(Own) - owner or representative of company who owns the property
(OP) - operator or currently held by option
(Cons) - consultant who had worked on property

SELECTED REFERENCES

1. Agriculture Canada, BC Ministry of Environment (1981) Soil Landscapes of British Columbia

2. Abermin Corporation Information Booklet, December 1985

3a,b BC EMPR (1985), (1986) British Columbia Mineral Exploration Review

4. BC EMPR MINFILE

5. BC EMPR Preliminary Map No. 58 (1985)

6. BC Ministry of Environment (1981) A Summary of Climatic Regimes of British Columbia

7a,b BC and Yukon Chamber of Mines May/June (1984), (1985) Prospecting, Exploration and Mining Review

8. Bacon, Donaldson & Associates (1981) Metallurgical Investigation on Submitted Gold-Silver Ore from Ashloo Mine

9. Campbell, C.J. (1983) Statement of Material Facts for Devon Industries, Vancouver Stock Exchange, November 25, 1983

10. Dearin, C. (1980) Report on the 1979-1980 Exploration Program at Surf Point for Banwan Gold Mines

11. GSA Cordilleran Section Meeting (1985) Field Guides to Geology and Mineral Deposits in the Southern Canadian Cordillera

12. Energy, Mines and Resources Canada (1980) Canadian Mineral Deposits Not Being Mines in 1980, Paper MRI 80/7

13. Environment Canada Report (1979) Mercury in the Canadian Environment, Paper EPS3-EC-79-6

14. Haig-Smillie, L.D. (1973) Sea Water Floatation, Texada Mines Ltd., Gilles Bay, B.C.

15. Harris, C.R. (1985) Tellurides in Doratha-Morton Samples, note to Signet Resources

16. Hawthorn, G. (1983) Metallurgical Report for Trader Resource Corp., Yellow Giant Property

17. Hawthorn, G. (1986) Extraction of Gold from Mill Tailings and Mine Waste; Preliminary Testing on Surf Inlet

18. Honsberger, J.C. (1973) Report on the Former Surf Inlet Consolidated Mines Ltd. Property, Skeena Mining Division, B.C.

19. Kennedy, T. (1986) Economic Evaluation of the Ashlu Creek Gold-Tungsten Property

20. Lafeniere, T.H. and Brown, P.J. (1982) Preliminary Floatation Study, Pacific Cassiar Ltd., British Columbia

21. Legg, R.E. (1936) Milling Practice at the Surf Point Mine

22. Manchuk, B. (1977) Final Report on Banks Island Gold

23. MacDonnell, G.F. (1938) The Privateer Mine, Zeballos

24. Northern Miner Press (1985) Canadian Mines Handbook 1985/86

25. Parrish, I.S. (1980) Report on Hunter Group, Khutze River, B.C.

26. Pitt, D.L. et. al. (1933) Milling Methods and Costs at the Concentrator of the Premier Gold Mining Co., USBM I.C. 6742

27. Scott, T.C. (1984a) Geological and Geochemical Report on the Hunter Property

28. Scott, T.C. (1984b) Diamond Drilling Report on the Hunter Property

29. Shearer, J. and Seraphim, R.H. (1985) Report on the Trader Resource Corp. Bob Deposit, Yellow Giant Project, Banks Island

30. Sinclair, A.J. and Hansen, M.C. (1983) Resource Assessment of Gold-Quartz Veins at the Zeballos Mining Camp, A Preliminary Report, BC EMPR Geological Fieldwork 1982

31. Stevenson, J. (1950) Zeballos Mining Camp, British Columbia, BCDM Bull. No. 27

32. Sutherland Brown, A. (1964) Geology of the Queen Charlotte Islands, BCDM Bull. No. 54

33. TRM Engineering Ltd. (1983) Prefeasibility Study on Banks Island Gold Deposits

34. Vincent, J.S. (1984) A Progress Report on the Lucky Jim Prospect, Quadra Island, British Columbia

35. Warren, H.V. and Cummings, J.M. (1936a) Mineralogy of Surf Point and Hunter Veins

36. Warren, H.V. and Cummings, J.M. (1936b) Mineralogy of Some Abco High Grade Samples

37. Warren, H.V., et. al. (1940) Variations in Distribution of Tailings Losses in Some B.C. Mines

38. Water Survey of Canada (1983) Surface Water Data Reference Index

39. Witteck Development Inc. (1986) Exploratory Metallurgical Testwork on Spud Valley Gold Ore for McAdam Resources

PART II

PORTABLE MODULAR MILL DESIGN

PART II

PORTABLE MODULAR MILL DESIGN

1.0 INTRODUCTION

1.1 GENERAL

This report was prepared in conjunction with a mineral resource assessment for the coastal area of British Columbia.

Because of the ease in accessing much of this area and the moderate climate, a relatively low cost barge mounted concentrating plant can be transported to the site and operated year-round.

Elsewhere in the province, the barge-mounted configuration is not feasible, and an "open" plant cannot be operated during winter due to freezing conditions.

It is anticipated that, while the proposed modules can be winterized, the cost of building structures and ore storage will substantially increase the capital expense.

The modular plant will therefore be fabricated in one of the following configurations:

-- A complete plant assembled on a barge which can be towed to the site. Plants with capacities up to several 100 tpd can be constructed on a single 40' by 130' barge.

-- A complete plant constructed on tractor trailer units which can be hauled to the site and arranged on a prepared base for seasonal operation.

For demonstration purposes, detailed costings have been provided for production rates of 50 and 100 tpd. For reasons of economy (both capital and operating costs) the 100 tpd plant cannot consist of two 50 tpd plants operated in parallel.

It is anticipated that after arrival at the prepared site, the modular mill will be in operation within a few days.

Technically it is possible for the modular plant to operate as an itinerate concentrating facility which can travel in the course of a year to several sites and process accumulated ore. Financially this will not likely be attractive due to the high working capital associated with stockpiling ore and the expense of mobilizing the plant.

The major advantages of a modular constructed plant are as follows:

- -- reduce the capital cost by off-site construction;
- -- maximizing the recapture of capital on cessation of operations;
- -- minimize the cost of site reclamation.

Because of the diverse production rates and processing flowsheet requirements which will be encountered throughout the province, it is not possible to ecnomically design a single flowsheet which will satisfy all requirements.

The report has been arranged so that a mining company, after completing the metallurgical testing and flowsheet design, can select modules which will satisfy the process requirements.

Sufficient data is presented so that the capital and operating costs can be determined with a confidence of +/- 15%.

The information contained in this report contains sufficient detail to:

- -- determine the ore testing requirements;

- -- prepare capital and operating cost estimates of modular mills;
- -- determine the water and power requirements.

Although crushing, grinding and flotation circuits are not difficult to design and operate, the same is not true of cyanidation and cyanide destruction operations.

It is important, therefore, to retain the services of a mineral processing specialist during the testing, design and plant commissioning stages if cyanidation is anticipated.

1.2 RESOURCE ASSESSMENT

The Resource Assessment indicates 8 metallic mineral deposits in Category A located in the study area which may benefit from the use of a modular constructed concentrating facility.

Most of the deposits are at low elevations, adjacent to tidewater and may be accessed and operated on a year-round basis.

Several localities have had previous operations and are well-documented.

The capital cost study indicates that where a deposit is adjacent to tidewater, even if it has road access, the mill should be constructed on a barge which can be towed to the site.

On abandonment of the operation, the barge can be removed, leaving little evidence of any previous milling operation.

2.0 PLANT CAPACITY

The Resource Assessment indicates that potentially exploitable deposits within the study area may contain mineable reserves of 10,000 to 1,000,000 tonnes.

The capacity of a concentrator which can be supported by this size of deposit depends upon the following:

-- the financial feasibility;

-- the rate at which the deposit can be mined (open pit mineable deposits are not technically constrained in their mining rate, but small tabular underground ore bodies may suffer from limited accessibility which will control both the mining and milling rate);

-- the rate at which the product can be sold. This is not a restriction for sellers of bullion, but could be where a material has limited market acceptability and arsenical concentrates.

A detailed financial and technical study is required before the optimum production rate of a particular deposit can be determined. This is beyond the scope of this report, however, the following rule-of-thumb has been employed.

Life (years)=0.2 (4th root of mineable reserves in tonnes)*

For example:

MINEABLE TONS	LIFE YEARS	OUTPUT TPD
50,000	3.0	46
100,000	3.6	76
150,000	3.9	105
200,000	4.2	130
400,000	5.0	220
600,000	5.6	290
1,000,000	6.3	430

Typically, concentrators operate on a 24 hour day and 7 day week schedule.

The capacity of the accompanying crushing plant (typically 6-40 tph) is principally dictated by the top-size of the as-mined ore. Crushing plants are usually operated for less than 2 shifts per day, with 6 hours being a common figure for small plants with a well-sized plant.

* (see ref. (1), Taylor, H.K.)

Surge capacity is provided both before and after the crushing plant to provide a buffer between the mine and the grinding circuit. The capacity of the surge and the tonnage distribution between coarse and fine ore will be dictated by the mining schedule and the efficient utilization of operating labour and mobile equipment.

Because of the moderate coastal climate, it is anticipated that freezing problems will be insignificant. Only minimal bin capacity will therefore be provided. Coarse ore will be stored in stockpiles, which will be outside and uncovered. This may cause an occasional disruption to the operation, however this is an acceptable trade-off with capital and operating costs.

3.0 FLOWSHEET OPTIONS

Several of the properties have had either an operating history or laboratory testing, in which case the proposed concentration procedures are offered with confidence.

Other deposits are less well-documented and the proposed flowsheet has been determined predominantly by mineralogical parameters.

Examples of flowsheet options for several deposits are illustrated in the following table.

Deposit	Values	Flowsheet Options			
		Gravity	Cyanidation	Flot.	Flot + Cyan
Banks					
- Kim	Au		X		X
- Tel	Au		X		
- Discovery	Au		X		X
- Bob	Au		X		X
Surf Inlet	Au			X	
Zeballos	Au	X (optional)			X
Surf Point (Eyde Pass)	Au			X	
Hunter Point	Au			X	

4.0 METALLURGICAL TESTING

The metallurgical evaluation of a property should be performed simultaneously with the geological exploration.

As soon as a property becomes potentially viable, representative sample(s) from the deposit should be subjected to preliminary testing.

The nature of these few tests, perhaps only 2-4 in total, depends upon the mineral associations of the potential economic minerals. Testing of gold and/or silver ores will typically include one or more of the following:

- -- flotation concentration;
- -- cyanide leaching;
- -- gravity separation in conjunction with flotation or cyanidation.

If satisfactory results are reported in these tests, the exploration can continue with the confidence that the "ore" can be turned into a marketable product.

Later, when the deposit is better understood or if different mineral associations are encountered, additional or confirmatory testing should be performed.

Such tests would include:

- optimization tests on the technically feasible options;
- work index tests;
- thickening and filtering tests (only if these unit operations are appropriate to the anticipated flowsheet);
- in the case of gold and/or silver cyanidation leaching, carbon loading and stripping testing should be done;
- the effluent solution should be assayed for heavy metals and cyanide, if appropriate;
- if cyanidation is being considered, cyanide destruction testing should be performed;
- acid generating potential.

The estimated cost of testing readily processed ores is as follows:

- Preliminary (2-4 flotation/cyanidation tests): $1500;
- Detailed to prepare an optimized processing flowsheet and size equipment: $20,000. If pilot plant studies are warranted the cost may exceed $100,000.

5.1 CRUSHING EQUIPMENT

This section has been summarized in a table format with supplemental notes available in the Appendix section of the report.

The following assumptions have been made of the physical characteristics of the material being crushed.

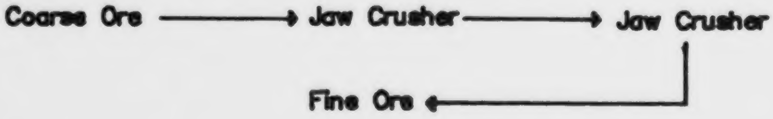
1. Ore does not contain clay or snow.
2. Oversize material is handled by:
   (a) Grizzly on top of coarse ore bin;
   (b) Sledging or blasting.
3. Ball mill feed ranges from -1" (25 mm) to -1/2" (12 mm).
4. If it is necessary to crush the ball mill feed to less than -1/2" (12 mm), second stage crushing is needed.

Component	Purpose	Comments
Coarse Ore Bin	To maintain steady feed to the grinding circuit.	-Coarse ore stockpile adjacent to the crushing plant.

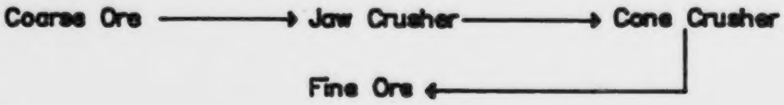
Component	Purpose	Comments
		-Capacity for on-site front end loader.
Fine Ore Bin	To maintain steady feed to the grinding circuit.	-Fine ore stockpile adjacent to fine ore bin. -5-15 tons live capacity.
Crushers	To size product.	-Single toggle configuration better in secondary crushing role. -Small magnet may be installed ahead of second crusher to retrieve malleable material.
Conveyors	To carry ore through crushing plant.	-Min. width 18" (450 mm). -Safety pull cords required. -Fasteners to join belting.

Component	Purpose	Comments
		-Shaft-mounted speed reducer best drive system. -Installing backstop will prevent inclined conveyor from running from running backward if shut down under load.
Vibrating Screens	To size final product of the plant.	-Single deck screen satisfactory. -Screen cloth life expectancy 1 month - backup required. -Well enclosed because of dust.
Dust Collection	To collect dust at emission point and to clean air before exhaust.	-Impingement unit in which dust removal is incorporated into the fan is cost-effective.

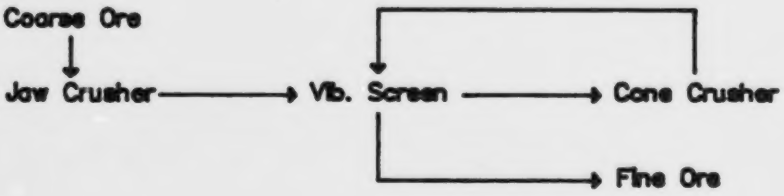
Option 1


Coarse Ore
Jaw Crusher
Jaw Crusher
Fine Ore

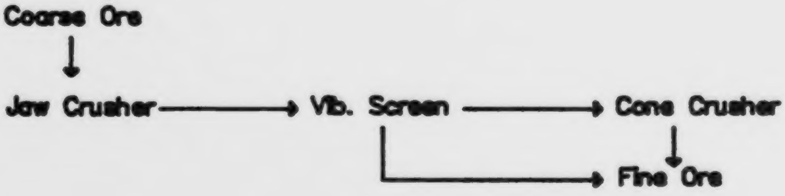
Option 2


Coarse Ore
Jaw Crusher
Cone Crusher
Fine Ore

Option 3


Coarse Ore
Jaw Crusher
Vib. Screen
Cone Crusher
Fine Ore

Option 4


Coarse Ore
Jaw Crusher
Vib. Screen
Cone Crusher
Fine Ore

Portable Modular Mill

2 Stage Crushing Options

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate 1

5.2 GRINDING

This section has been summarized in a table format with supplemental notes available in the Appendix section of the report.

The following assumptions have been made in regards to the grinding mill.

1. A single stage ball mill circuit is used.
2. A 6' diameter mill can be moved by truck.
3. A 6' x 8' mill consumes 125 HP and can process 100-150 tpd.
4. Grinding mills are in closed-circuit with a cyclone for product sizing.

Component Selection

Component	Purpose	Comments
Fine Ore Feeder	To provide consistent, quality feed for recovery circuit.	-Feed rate can be controlled by adjusting feed opening or varying conveyor speed.

Component	Purpose	Comments
Grinding Mill	To process ore for the recovery unit.	-0.9 tpd ore processed per 1 HP used. -Portability important. -Concentrators using rubber liners reduce downtime.
Classifiers	To size ground ore for recovery circuit.	-Hydrocyclone most commonly used and best system as inexpensive, effective and requires no floor area.
Pump	To feed cyclone.	-Horizontal, rubber-lined best model.

5.3.1 GRAVITY EQUIPMENT

When coarse metallic gold or silver minerals are found in the ore, the installation of a jig at the end of the grinding mill is usually appropriate.

In most cases, the grade of this product is quite low and needs to be cleaned if it is going to be sold as a gravity concentrate. Typically this is done on a Wilfley table which is operated intermittently with as many passes as are required to produce a high grade concentrate.

Until recently, it was acceptable to amalgamate the jig concentrate with mercury. This practice has fallen into disfavour since inevitable mercury losses from the system will persist in the environment and will contaminate the site effluent beyond the abandonment of the operation.

If the gravity concentrate grade is low in spite of additional cleaning, the only recourse is to either accept a low return on sale of concentrate or to cyanide the gravity concentrate by what is known as "intensive cyanidation".

Jigs

Most gold and silver mills which utilize gravity concentration, employ a Denver duplex jig which is installed at the discharge end of the grinding mill.

These units are manufactured by others and are readily available in a competitive market.

5.3.2 FLOTATION EQUIPMENT

The conventional flotation machine consists of a series of agitators mounted in-line on a rectangular tank.

The most commonly installed and available units, known as Sub-A's combine the ability to agitate, aerate, and pump in a single mechanism. Although this flexibility is a good feature, the efficiency of the unit is low.

A modified version, still widely used even in large concentrators, was developed with much improved mechanical efficiency. These units, known as D.R.'s are not capable of pumping and need to have air supplied by an external blower.

Because of increasing energy costs, another type of machine known as a Maxwell cell is worth considering. These units consist of an agitator mounted in a cylindrical tank with a continuous circumferential overflow launder for concentrate discharge. Flotation air is supplied by a blower.

Both the initial and operating cost of the Maxwell cell is much lower than the conventional machine.

Pumps

Horizontal centrifugal pumps should not be installed for handling unthickened flotation concentrate since airlocking and spillage will probably occur.

Vertical pumps are a much better choice for this service since they eliminate air more effectively and, if properly sized, will operate without spillage.

5.3.3 CYANIDATION EQUIPMENT

Equipment in contact with cyanide solution must be specified to avoid those metals which will be attacked by the cyanide. These include: aluminum, zinc, copper and its alloys. Mild steel and wood stand up well to cyanide. Except in rare cases it is not necessary to specify stainless steel.

Leaching Tanks

Leaching tanks are most frequently fabricated with mild steel.

Wood stave construction is still used and may be attractive where the equipment will be installed outside in a cold climate or at a remote site.

Agitating Mechanisms

The suppliers of agitators have become adept at designing and fabricating energy efficient units. It is therefore critical to avoid installing older high-speed agitators which frequently consume several times the energy of modern units.

These high efficiency agitators have made it very important to correctly specify the particle size and specific gravity of the material which will be suspended.

The agitator blade assemblies can be cast or fabricated. In either case the blades should be rubber-covered. Some manufacturers offer detachable blades which are an excellent choice from a maintenance or alteration viewpoint.

Agitator drives will be offered with either totally enclosed motor-reducers or vertical reducers which are V-belt driven. The later units are no more expensive and can be easily and usually inexpensively altered if the operating conditions differ from the specifications.

Slurry Pumps

In small capacity plants, vertical pumps of the type which include a feed sump are preferred, because they: do not require gland water; are inexpensive; and do not require a separate pumpbox at additional cost.

Water Pumps

Small capacity cyanidation plants can use domestic type water pumps provided that totally enclosed motors are specified and the pumps are either iron or plastic. These pumps typically have mechanical seals which stand up well in this service.

5.3.4 REAGENT FEEDERS

In a small plant it is difficult to improve upon Clarkson feeders for adding flotation reagents (frothers & collectors) and cyanide in solution form.

Lime or caustic soda can be added to a cyanide circuit by hand in small lots, providing reasonable caution is exercised to avoid caustic burns.

5.4 USED EQUIPMENT

Available used equipment can both speed up plant construction and lessen its cost. However, the following cautions should be noted:

1) Rebuilt used equipment should have a performance warranty.

2) Some equipment oversizing is permissible, but excessively large components should be avoided. Flotation machines and compressors must be carefully selected as they can annually consume power worth triple their capital cost.

3) Older equipment may not be energy efficient.

4) Drawings, including foundation details, should be obtained for use in fabrication and ordering spare parts.

5) Obsolete equipment for which spare parts are not readily available should be avoided.

6) A source of replacement liners for the crushers and grinding mills must be located before purchase.

7) The cost of upgrading older magnetic starters to the 1982 Code is usually prohibitive and such equipment is best discarded.

8) Careful inspection of cone crushers and grinding mills is recommended.

9) Operating and maintenance manuals should be acquired.

6.1 ASSAYING

The nature of the on-site assaying facilities will depend upon the particular element(s) which is being concentrated.

Frequently, for short term applications, the assaying and sample preparation facilities are located in a trailer unit(s). This can be assembled under the direction of a qualified assayer who will develop and document procedures which can then be taught to the site personnel.

The analysis of many metals is now performed by atomic absorption instruments. These units are found in all commercial and most industrial labs and are the preferred choice for many frequently encountered elements such as: copper (Cu), lead (Pb) zinc (Zn), iron (Fe), silver (Ag), as well as gold (Au) in solution.

Gold (Au) analyses are generally performed by fire assaying because of its high accuracy on high grade products such as gravity concentrates and bullion.

Occasionally an ore will be encountered which can be mined and processed without the benefit of on-site assaying, providing that commercial lab facilities are conveniently located and the results can be reported within very few days. This would occur where the valuable constituent of the ore is both visible and easily separated from the waste.

For the purposes of this study, it is assumed that on-site assaying facilities will be provided.

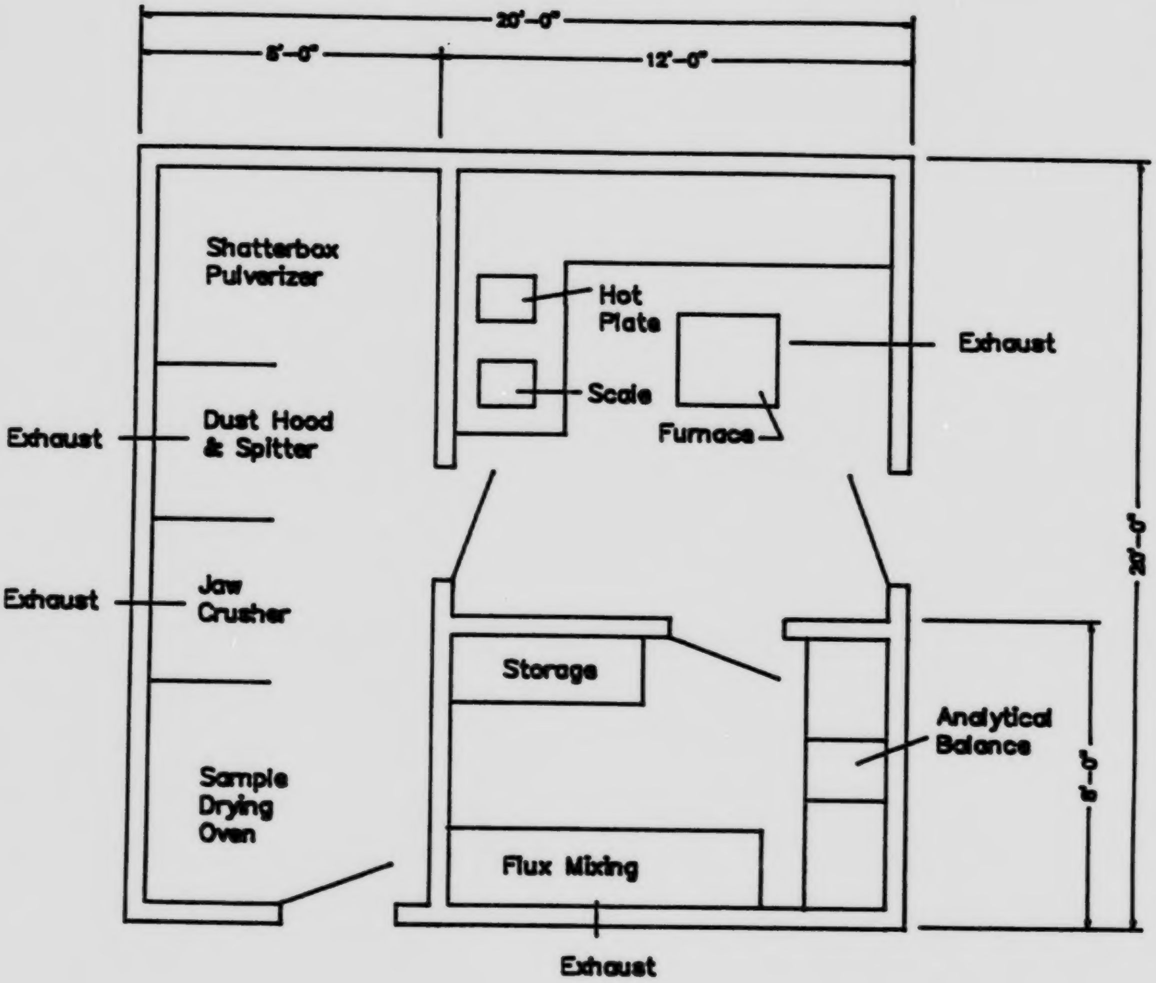
SAMPLE PREPARATION

Before samples are assayed they must be reduced to a fine powder and be well blended. This will require a jaw crusher (5" by 6") and a pulverizer.

Until recently the only pulverizer which was manufactured was the rotary disk type. These have been made redundant within the last 10 years by shatterbox pulverizers which are totally enclosed and produce an extremely fine and homogenous product. These units are more expensive to purchase than rotary pulverizers, $5,000 vs $2,000, but they do not require a ventilation system and the grinding pots last almost forever.

The rotary pulverizers, on the other hand, produce a great deal of dust and require frequent plate replacement at a cost of $100 - 150 per set.

A general arrangement of the proposed sample preparation and assaying facility is shown on the next page.


20'-0"
8'-0"
12'-0"
Shatterbox Pulverizer
Hot Plate
Exhaust
Scale
Furnace
Exhaust
Dust Hood & Spitter
Exhaust
Jaw Crusher
20'-0"
Storage
Analytical Balance
8'-0"
Sample Drying Oven
Flux Mixing
Exhaust

Portable Modular Mill	
Fire Assay Office	
TRM Engineering Ltd.	
Scale	**Date**
G Hawthorn	**Plate** 2

6.2 WATER SUPPLY

The quantity of make-up water which is required will depend upon whether water is recycled from the tailing disposal site (i.e. tailing pond).

Where the quality of the effluent is environmentally acceptable, and water is readily available, it is frequently best to allow the tailing facility to decant clear solution and to use fresh water exclusively in the plant.

This can be determined in the laboratory while performing flotation tests using plant site water.

Because of the relatively high cost of destroying cyanide prior to discarding solutions, cyanidation plant operators maximize solution recycle.

Typical plant water requirements for a 50 tpd concentrator are shown below:

	MAKE-UP WATER	
RECOVERY TECHNIQUE	NO RECYCLE	MAX. RECYCLE
Flotation	135 - 25[1]	36 - 7
Cyanidation	-	" "

[1] Cubic meters per day - USGM

If water is in short supply and recycle is to be practiced, it may be necessary to impound water in the tailing pond before start-up.

6.3 TAILING DISPOSAL

The options for tailing disposal are typically limited to:

- -- above ground within a man-made containment, i.e. tailing pond;
- -- a naturally occurring depression in the terrain which will frequently contain a lake;
- -- the nearby ocean.

Within the resource assessment area, all 3 options exist at 1 or more sites.

In the majority of the indicated mill sites maritime disposal appears to be an attractive option and, in some cases, may be the only option where the terrain is steep and the area is traversed by an environmentally sensitive watercourse.

For example, the Trader Resource Corp.'s Banks Island deposits are located within 2 km of tidewater, the terrain is relatively flat, and the site contains many small lakes. All 3 disposal options therefore merit examination.

It is anticipated that the cost of site investigation and documentation will be greatest for the maritime disposal option, but potentially it may be substantially less expensive to operate.

Several government agencies are involved in the permitting system. Application for permitting is channelled through the Ministry of Environment which will handle communications with the other provincial agencies.

The federal agency, Environment Canada, will become involved in permitting where federal fisheries are of a concern.

6.4 POWER

Potentially, power could be obtained from any of the following sources:

--B.C. Hydro grid.
--Diesel-electric generators.
--Hydro-electric generators on-site.

The most straight forward method of supplying power is by diesel-electric generators, although it usually is the most expensive when both capital and operating costs are considered.

Because of the high rainfall on the coast of B.C., an on-site hydroelectric generating plant should be considered.

6.5 MOBILE EQUIPMENT

The following mobile equipment is required:

1) Front end Loader. This machine will provide surge capacity between the mining and milling operations.

2) Half-Ton Pick-Up or One Ton Truck. It will be equipped with a hydraulic boom and used to move supplies.

7.0 FABRICATION

7.1 LOCATION

The plant modules or barge mounted plant should be fabricated in a location which has a full complement of competitively priced fabrication services.

Because of the simplicity of the plant layout, detailed drawings will be minimal and be limited to general arrangements to locate the major components on their modules.

A structural designer should work in close contact with the fabricator so that the maximum use can be made of sketches for fabrication details.

In all likelihood fabrication will be done in the Lower Mainland due to the relative availability of equipment, services, and the required technical knowledge.

7.2 MODULE CONFIGURATION

Barge Mounted Plant

The entire crushing and concentrating plant will be installed on a single used wood chip barge with dimensions of 40' by 130'.

The deck loading capability of the barge is 500 lbs./sq. ft. which is satisfactory for direct mounting of all of the components with the possible exception of the grinding mill.

It is assumed that any barge-mounted plant will be able to operate on a 12 month basis. A cover will therefore be installed, since heavy rainfall can be anticipated in all of the coastal areas.

Wood frame construction should be avoided due to the risk of fire.

Truck Transportable Modules

All of the processing components and a reasonable inventory of operating and maintenance spares will be mounted on tractor-trailer units for transportation to the mill site.

The following modules will be constructed:

Module	Contains
Crushing	All crushing and conveying components. The coarse ore bin and feed conveyor will be transported to site on the trailer for field erection. Spare parts for the crushers, conveyors, and screens.
Grinding	This trailer unit will contain the grinding mill and cyclone. The fine ore hopper, ball mill feed conveyor, and cyclone feed pumpbox will be transported on the trailer for field erection. The grinding mill ball charge will be shipped in drums and will be distributed to load the trailer units to capacity.

Larger capacity grinding mills will require special consideration due to their relatively high weight. A mill which is capable of processing 100 tpd may need to be rubber lined to reduce its weight sufficiently that it can be transported intact. Special trailer stiffening will be required to maintain the drive in alignment.

Flotation & Filtering	A single trailer unit will contain all of the flotation and dewatering equipment.
Cyanidation	Two trailer units will be required to contain the leaching tanks, the carbon stripping, electrowinning and reactivation equipment, and smelting furnace.
Power Supply Shop Storage	A single van-type trailer unit will contain these services. The van will be divided to isolate the noise and heat produced by the generators.

7.3 TIME SCHEDULE

The time schedule to complete construction of the plant will depend upon the availability of the processing equipment.

Good used equipment can likely be purchased which will tend to reduce both the capital cost and the construction period.

An anticipated fabrication schedule is as shown on the following page:

	WEEK											
EVENT	1	2	3	4	5	6	7	8	9	10	11	12
Select Fabrictor	xxx											
Purchase Equipment	xxx	xxx	xxx	xxx	xxx							
Overhaul Equipment		xxx	xxx	xxx	xxx	xxx						
Fabricate			xxx	xxx	xxx	xxx	xxx	xxx				
Prepare Site					xxx	xxx	xxx	xxx				
Transport									xxx			
Field Erect										xxx		
Start-up											xxx	

8.0 MOBILIZATION

The portable mill will be built on a barge or be moved by truck.

1) Barge. A tug will move the barge into place at a secure moorage or the unit can be beached.

2) Truck/trailer. Up to six trailers will be needed to move the processing plant and operating supplies. Units can be built on skids or directly on trailers.

A base must be provided on-site to provide a firm foundation and an all-weather work area. Cleanup will be facilitated in the concentration area by a concrete slab and sump. A curbed concrete apron and sump is essential in the cyanide solution area.

9.0 SUPPLIES

The operating supply requirement will become apparent when the plant flowsheet has been developed and the processing equipment selected.

It is important to carefully inspect and determine the condition and remaining life of the crusher and grinding mill liners at time of purchase. Since it is frequently difficult to estimate the life expectancy of liners, it is prudent if used equipment has been acquired to have at start-up a set of replacement liners. This is particularly true of cone crushers which are difficult to inspect in service and can fail prematurely if tramp steel passes the protective system.

If it is deemed unnecessary to inventory spare liners at start-up, a supplier should be located and estimated deliveries obtained. Liners are not off-the-shelf items. Lead times of several months are not uncommon if liner dimensioning, pattern making, casting, and machining are required.

Rubber ball mill liners are commonly used in small plants since the on-site crew can easily handle these lighter liners without any special lifting devices and without any significant risk of injury. Larger mills may also employ rubber liners, but in this case good metal liner handling equipment will exist, making the choice between rubber and metal liners purely economic.

Processing reagents are readily available from the inventories of several suppliers in Vancouver.

It is generally prudent to stock a length of conveyor belting equivalent to the longest installed conveyor.

10.0 SUMMARY - SAMPLE PLANTS

By way of example, 3 of the deposits have been highlighted in Appendices A, B and C.

The following data have been presented for each of the 3 examples:

- Anticipated Metallurgy
- Capital Costs (Summary and Details)
- Flowsheets
- Plant Configuration
- Operating Cost
- Electrical Power Requirements

The proposed flowsheets and methods of construction have been determined based upon the data available and may not represent the final choice as determined by testing and further site evaluations.

Figures which are attached to Appendices A, B and C have been inserted such that Appendix "A" contains all of the general flowsheet and equipment data. Subsequent appendices contain only those figures which are relevant to the specific examples.

10.1 COSTS - CAPITAL & OPERATING

The capital and operating costs for the 3 examples are summarized below:

Example	Description
A	--230 MTD (250 TPD) flotation/cyanidation. --barge mounted. --diesel-electric power.
B	--230 MTD (250 TPD) flotation. --modular plant/barge transported. --captive hydro-electric power plant.
C	--70 MTD (75 TPD) flotation/cyanidation. --barge mounted. --hydro-electric power.

Example	A	B	C
Capital Cost (plant only)			
--$	1,109,000	867,000	876,125
--$/MTD	4,800	3,800	12,516
Capital Cost (power supply)			
--$	305,000	1,800,000	-
--$/MTD ($ for daily ton capacity)	1,300	7,800	-
Operating Cost	22.11	10.01	19.72

Note that the capital cost of the processing equipment has been based upon reconditioned components, which typically will cost 40-60% of that of new equipment.

11.0 REFERENCE

Taylor, H.K., 1981, pp. 1-15, Mine Valuation and Feasibility Studies; in Mineral Industry Costs, Northwest Mining Association Publication. Editors: J.R. Hoskins; W.R. Green.

12.0 SYMBOLS

MTD	metric tonnes per day
TPD	short tons per day
M/Min	meters per minute
oz/t	troy ounces per ton - multiply by 34.2 to convert to gm/t or ppm
gm/t	grams per tonne = ppm
ppm	parts per million
cw	complete with

APPENDICES

APPENDIX A

SAMPLE PLANT "A"

--230 MTD Au mill utilizing flotation, with carbon-in-leach (CIL) cyanidation of the flotation concentrate.

--Processing plant is barge mounted.

--Diesel-electric power supply.

ANTICIPATED METALLURGY

Flotation

Product	Wt %	Au oz/t	Distribution	
			Circuit	Overall
Concentrate	10.0	0.99	94.6	94.6
Flot. Tails	90.0	0.006	5.4	5.4
Feed	100.0	0.10	100.0	100.0
Cyanidation				
Bullion	--	--	93.9	88.8
Leach Tails	10.0	0.06	6.1	5.8
Flot. Conc.	10.0	0.99	100.0	94.6

Primary grind ---------35% - 200 Mesh
Concentrate regrind----90% - 200 Mesh

CAPITAL COST SUMMARY

ITEM	EQUIPMENT $	INSTALLATION $	TOTAL $
Barge	100,000	-	100,000
Crushing	132,625	50,000	182,625
Grinding	71,500	70,000	141,500
Flotation	36,500	30,000	66,500
Dewatering	26,000	25,000	51,000
Cyanidation	107,600	25,000	132,600
Electrical	20,000	20,000	40,000
Piping	4,000	4,000	8,000
Heat and Vent	8,000	12,000	20,000
Fire Protection	4,000	4,000	8,000
Shop Tools	10,000	1,000	11,000
Building Roof	-	-	50,000
Assaying	35,000	15,000	50,000
Mobile Equipment	-	-	-
950 Loader	60,000	-	60,000
Water Supply	10,000	4,000	14,000
(A) Total Direct	625,225	260,000	885,225
Sales Tax	-	-	62,300
Prepare Moorage	-	-	50,000
Transport Barge	-	-	25,000
Fuel Storage	50,000	10,000	60,000
Design Engineering	-	-	25,000
(B) Total Indirect	50,000	10,000	222,300
(C) Total Processing	675,225	270,000	1,108,525
(D) Power Generation (1)	300,000	5,000	305,000
(E) Total			1,413,525

(1) Includes the cost of the electrical distribution panel.

CAPITAL COST DETAILS - PROCESSING EQUIPMENT

ITEM NO.	DESCRIPTION	HP	WEIGHT TONNES	$
CRUSHING				
1-1	30 tonne coarse ore bin	-	5.0	10,000
1-2	30" by 15'belt conv.	2	1.0	4,500
1-3	30" by est. 50' conv.	3	2.0	6,000
1-4	15" by 24" jaw crusher	50	6.3	25,000
1-5	24" by 25' belt conv.	2	0.5	3,125
1-6	5' by 10' vib screeen	10	3.1	6,000
1-7	3' cone crusher	75	11.0	40,000
1-8	24" by est. 80' belt conv	5	1.8	10,000
1-9	250 tonne fine ore bin	-	13.0	25,000
1-10	Magnet	-	0.2	3,000
	Subtotal	147	43.6	132,625
GRINDING				
2-1	24" BY 15' belt conv.	2	0.5	3,000
2-2	7' by 6' ball mill	150	27.0	60,000
2-3	2 - 3" by 3" slurry pumps	20	1.0	4,000
2-4	3 - 10" cyclones	-	0.3	2,000
2-5	1.5" sump pump	5	0.3	2,500
	Subtotal	177	29.1	71,500
FLOTATION				
3-1	rougher flot machine	20	3.0	20,000
3-2	cleaner flot machine	5	0.8	5,000
3-3	flotation blower	10	0.3	2,500
3-4	1.5" slurry pump	3	0.3	2,000
3-5	2-2" by 2" slurry pumps	20	1.0	4,000
3-6	reagent mixing and feeders	0.5	0.3	3,000
	Subtotal	58.5	5.7	36,000
CONCENTRATE DEWATERING				
4-1	thickener	1	1.1	4,000
4-2	6' by 2 disc filter	2	1.0	16,000
4-3	vacuum pump	15	0.5	3,000
4-4	filtrate pump	0.5	0.1	1,000
4-5	18" by 10' belt conv.	1.0	0.5	2,000
	Subtotal	19.5	3.2	26,000

ITEM NO.	DESCRIPTION	HP	WEIGHT TONNES	$
CYANIDATION				
5-1	regrind mill	20	1.0	15,000
5-2	1.5" slurry pump	1	0.3	2,000
5-3A	4 - 6' by 6' leach tanks	-	1.3	3,500
5-3B	4 - agitators	12	0.6	12,000
5-4	6' by 2 disc filter	2	1.0	16,000
5-5	vacuum pump	15	0.5	3,000
5-6	barren soln. tank	-	0.4	900
5-7	low press. blower	10	0.3	4,000
5-8	cyanide destruction	1	0.3	5,000
5-9	1.5" sump pump	2	0.3	2,500
5-10	trash screen	-	0.1	2,500
5-11	safety screen	-	0.1	2,500
5-12	loaded carbon screen	-	0.1	2,500
5-13	carbon batch tank	-	0.1	700
5-14	carbon strip tank cw. heaters	12	0.5	3,000
5-15	2 - barren soln. pumps	1	0.1	2,000
5-16	electrolytic cell cw. rectifier	-	0.2	4,000
5-17	strip soln. pump	1	0.1	1,000
5-18	carbon reactivation kiln	-	1.0	3,000
	Subtotal	77	8.3	85,100

OPERATIONS COST EXAMPLE "A"

Data:

--Milling rate 230 MTD = 6900 MTM
--Diesel-electric power

Labour (1)	$/tonne	$/month
Supervision (mill supt)	.89	6,150
Wages - operating (8 operators)	5.04	34,800
Wages - repair	.70	4,800
Wages - assaying	.70	4,800
Subtotal - Labour	7.33	50,550
Materials		
Liners - crushing	.06	400
grinding	.12	830
Grinding balls	.94	6,490
Reagents - flotation	.20	1,380
- cyanidation	4.40	30,360
- cyanide destruction	.75	5,200
- smelting	.05	350
Assaying Supplies	.22	1,500
Misc maintenance supplies	1.00	6,900
Misc operating supplies	1.00	6,900
Subtotal	8.74	60,310
Power (33.6 kwh/t) - diesel-electric		
Fuel (33.6 x .25 l/kwh x $.65/l)	5.46	37,670
Labour - Maint.	.29	2,000
Parts	.29	2,000
Subtotal	6.04	41,670
Total	22.11	152,530

NOTE:

(1) includes direct wages + 20% benefit loading + camp costs @ $40/man day + 1 round trip flight/month to Vancouver @ $550.

ELECTRICAL POWER

Processing Plant

SERVICE	HP	KW	KWH/MONTH
Crushing	147	110	16,000 1
Grinding	177	132	95,000
Flotation	59	44	31,700
Dewatering	20	15	10,800
Cyanidation	77	57	55,500
Assaying	40	30	6,500
Lighting and Misc. 110 V	30	22	(33% load) 15,800
TOTAL	550	410	231,800

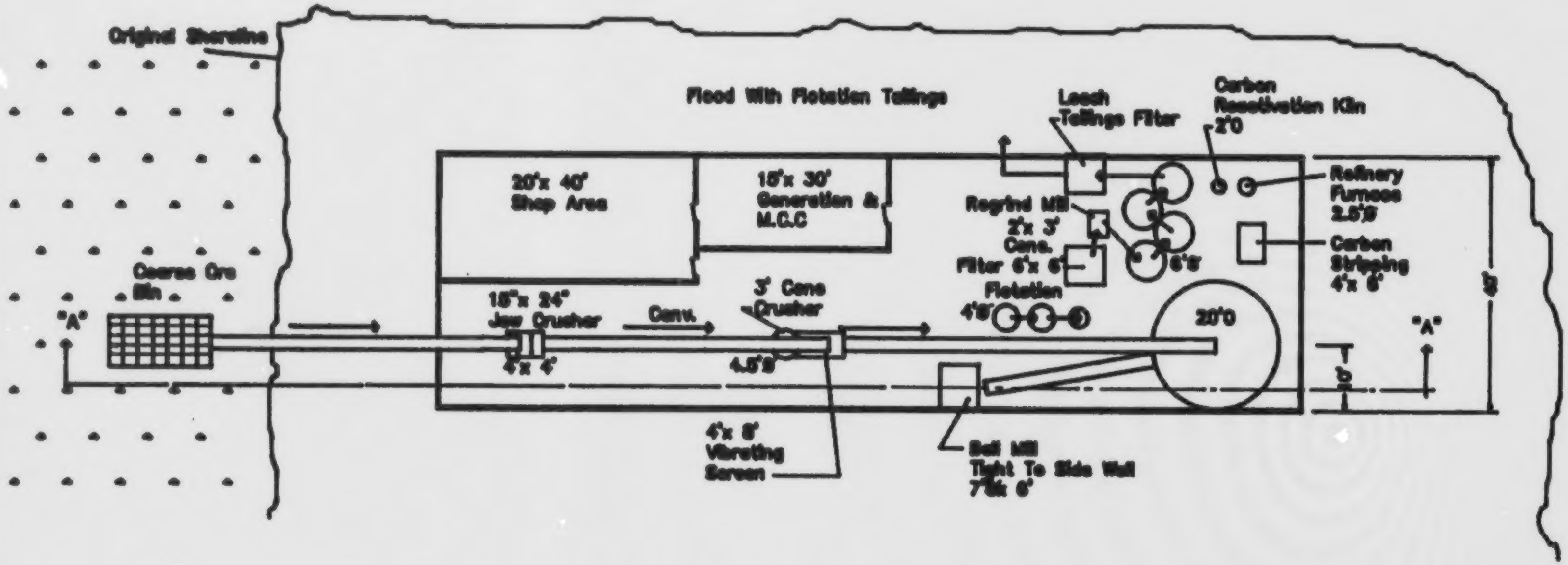
1 Operate 3 hrs/day

Grinding mill (only) - 11.7
Total Power Consumed - 33.6 kwh/tonne

DIESEL FUEL CONSUMPTION

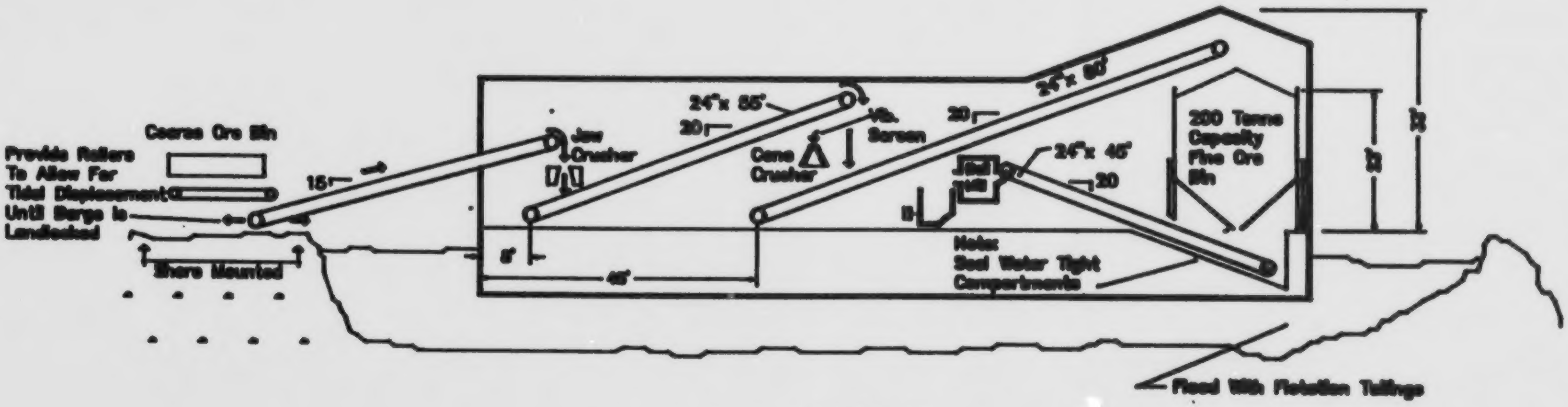
Power

Estimated diesel fuel cons. @ 13 kwh/U.S. gallon:
- 15,700 U.S. gallons/month
- 59,000 litres/month


Original Shoreline
Flood With Flotation Tailings
Coarse Ore Bin
"A"
20'x 40' Shop Area
15'x 30' Generation & M.C.C
15"x 24" Jaw Crusher
4'x 4'
Conv.
3' Cone Crusher
4.5'8
4'x 8' Vibrating Screen
Regrind Mill 2'x 3'
Conc. Filter 6'x 6'
Flotation 4'8'
Leach Tailings Filter
6'8
Carbon Reactivation Kiln 2'0
Refinery Furnace 2.5'8
Carbon Stripping 4'x 6'
20'0
Ball Mill Tight To Side Wall 7'6x 6'
"A"
5'
45'

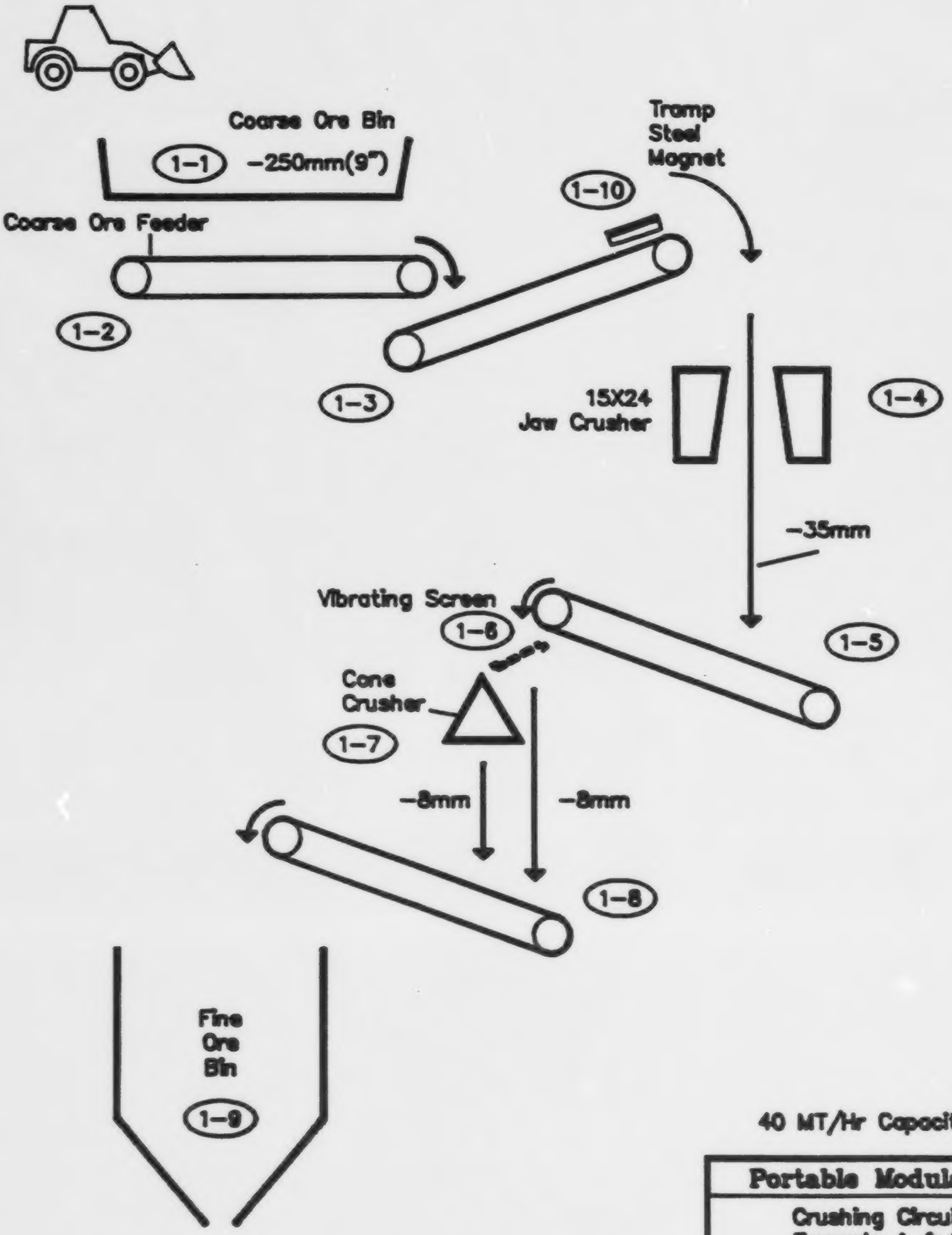
Plan View

Portable Modular Mill	
Barge Mounted Plant Example "A"	
TRM Engineering Ltd.	
Scale	Date
G Hawthorn	Plate A-1


Coarse Ore Bin
Provide Rollers
To Allow For
Tidal Displacement
Until Barge Is
Landlocked
Shore Mounted
15
Jaw
Crusher
8'
45'
24"x 85'
20
Cone
Crusher
Vib.
Screen
20
24"x 80'
24"x 45'
20
Ball
Mill
Note:
Seal Water Tight
Compartments
200 Tonne
Capacity
Fine Ore
Bin
27'
32'
Flood With Flotation Tailings

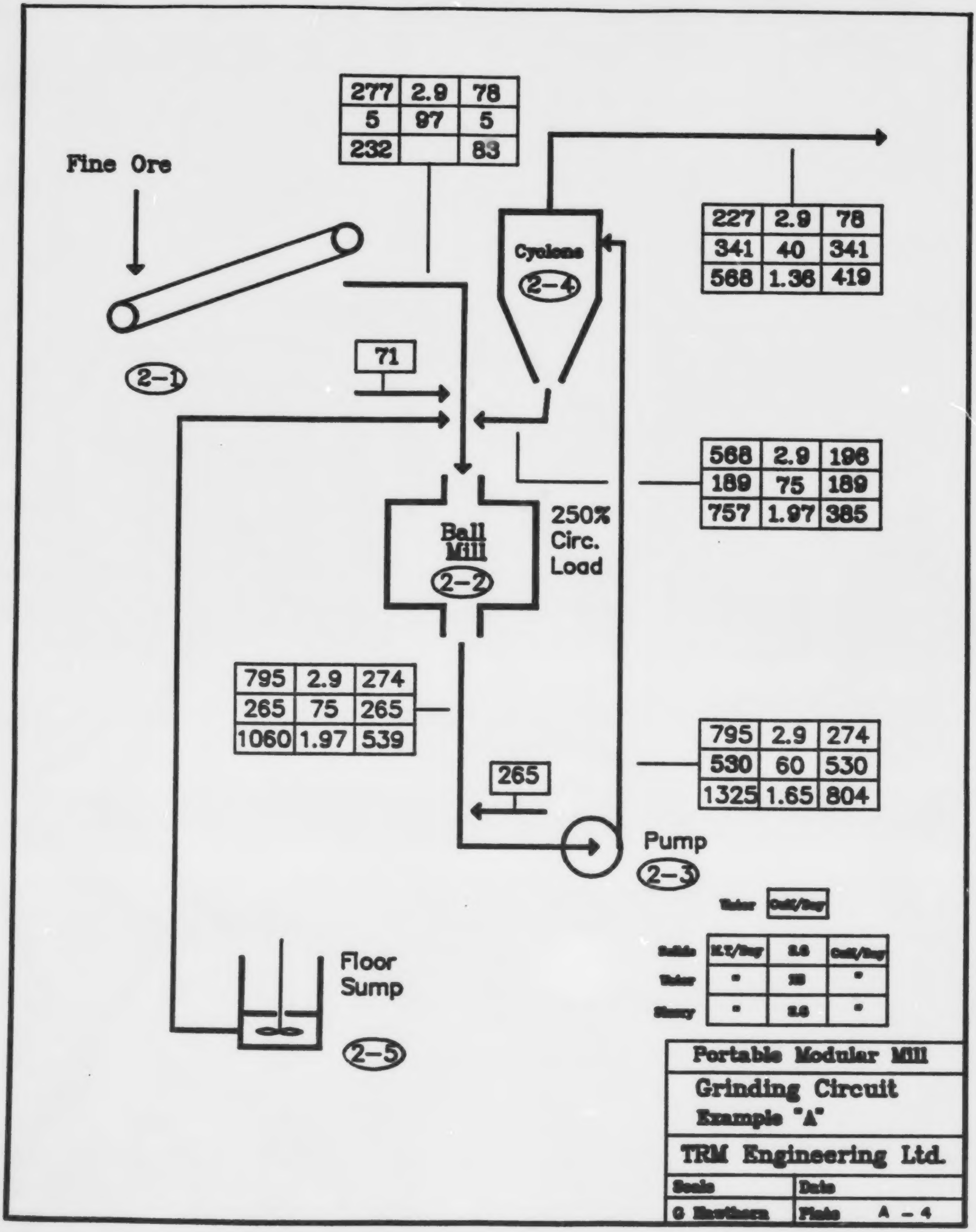
Elevation View
(Section "AA")
Example "A"

Portable Modular Mill	
Barge Mounted Plant Example "A"	
TRM Engineering Ltd.	
Scale	Date
G Hawthorn	Plate A-2


Coarse Ore Bin
1-1
-250mm(9")
Tramp
Steel
Magnet
1-10
Coarse Ore Feeder
1-2
1-3
15X24
Jaw Crusher
1-4
-35mm
Vibrating Screen
1-6
1-5
Cone
Crusher
1-7
-8mm
-8mm
1-8
Fine
Ore
Bin
1-9

40 MT/Hr Capacity

Portable Modular Mill	
Crushing Circuit Example A & B	
TRM Engineering Ltd.	
Scale	Date
G Hawthorn	Plate A – 3


Fine Ore
2-1
71
Cyclone
2-4
Ball Mill
2-2
250% Circ. Load
265
Pump
2-3
Floor Sump
2-5

277	2.9	78
5	97	5
232		83

227	2.9	78
341	40	341
568	1.36	419

568	2.9	196
189	75	189
757	1.97	385

795	2.9	274
265	75	265
1060	1.97	539

795	2.9	274
530	60	530
1325	1.65	804

Water CuM/Day

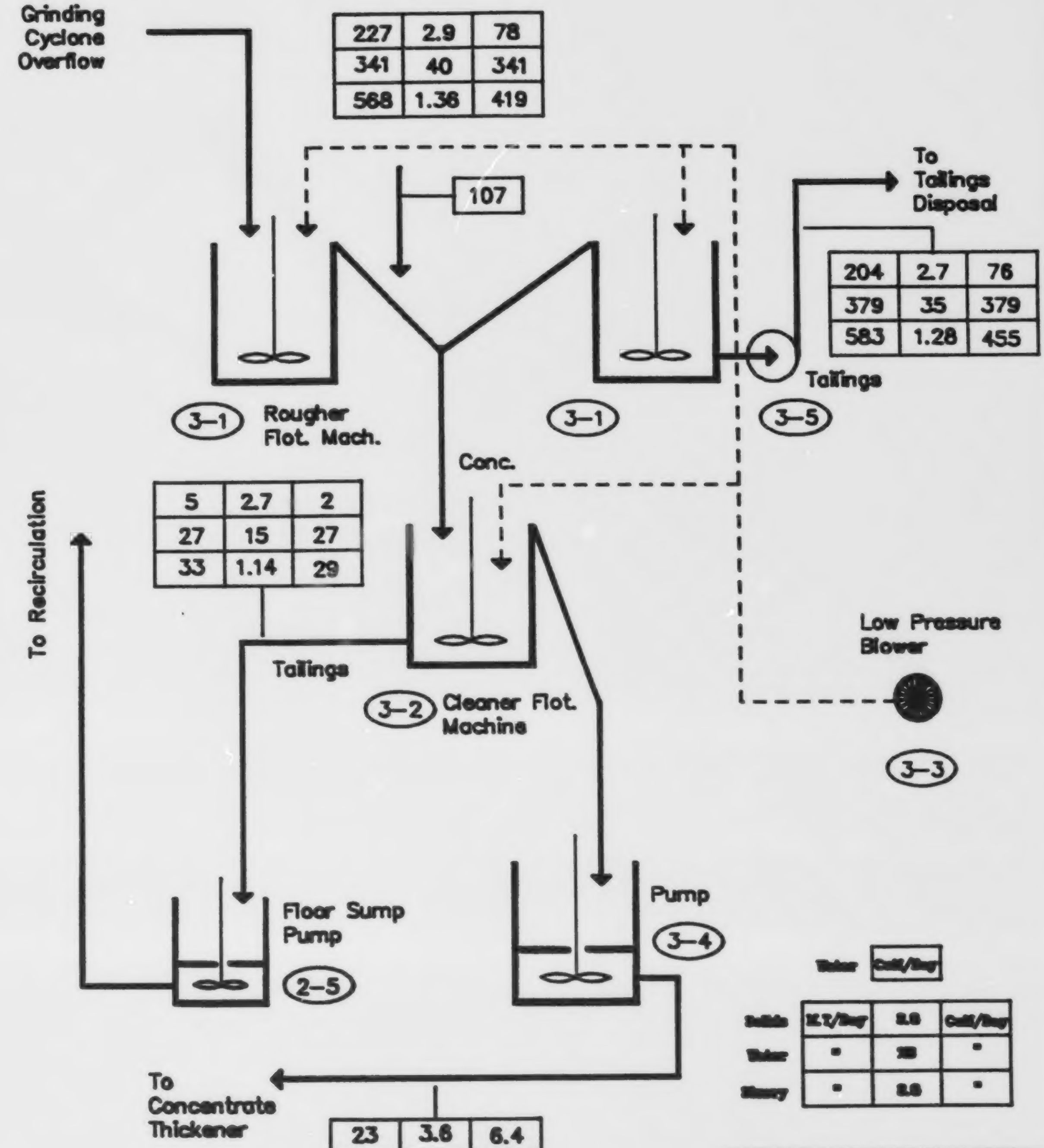
Solids	M.T/Day	S.G	CuM/Day
Water	"	%S	"
Slurry	"	S.G	"

Portable Modular Mill

Grinding Circuit
Example "A"

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate A – 4


Grinding Cyclone Overflow
107
To Tailings Disposal
Tailings
3–1
Rougher Flot. Mach.
3–1
3–5
Conc.
To Recirculation
Tailings
3–2
Cleaner Flot. Machine
Low Pressure Blower
3–3
Floor Sump Pump
2–5
Pump
3–4
To Concentrate Thickener

Grinding Cyclone Overflow

227	2.9	78
341	40	341
568	1.36	419

To Tailings Disposal

204	2.7	76
379	35	379
583	1.28	455

Tailings (3–2)

5	2.7	2
27	15	27
33	1.14	29

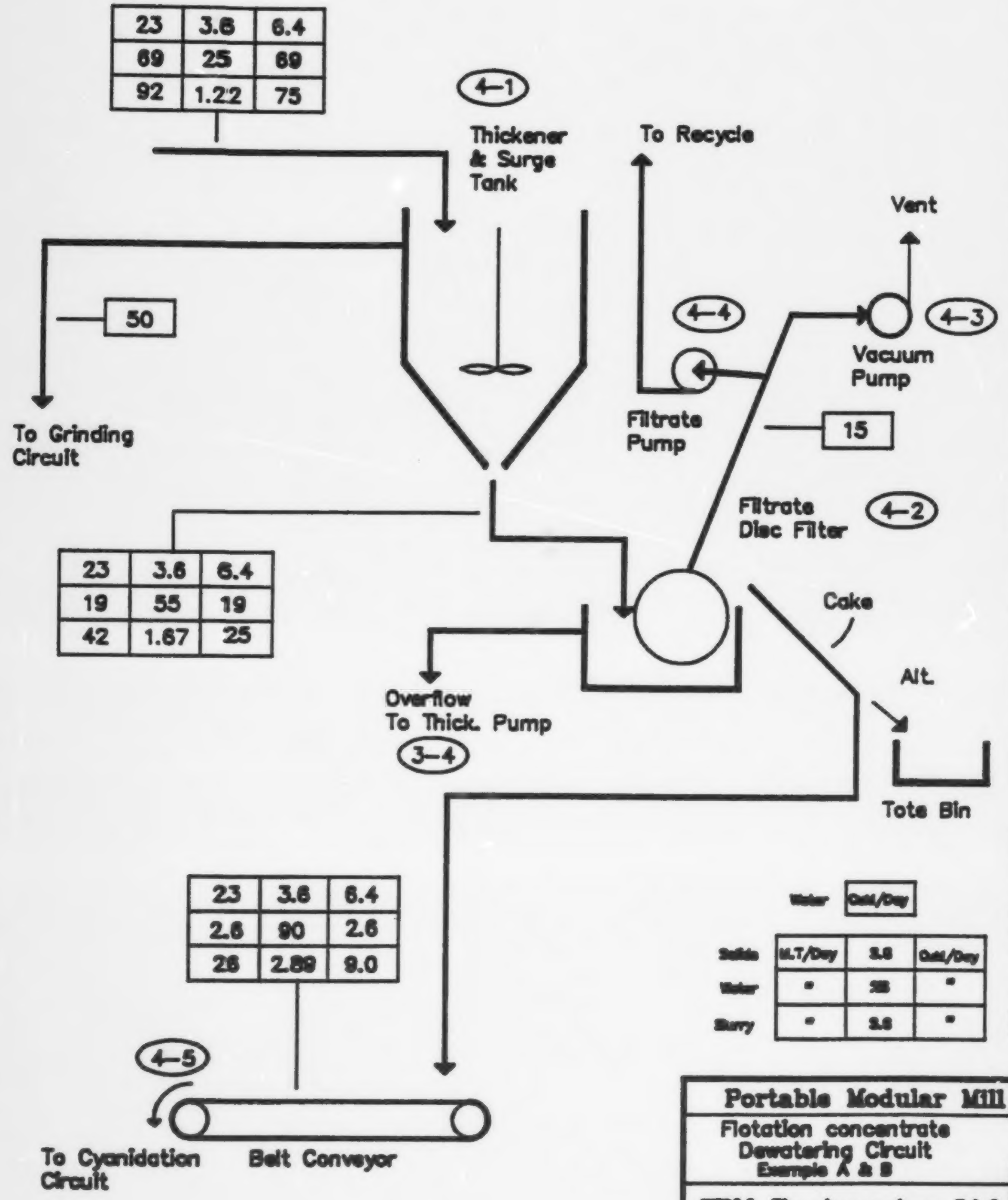
To Concentrate Thickener

23	3.6	6.4
69	25	69
92	1.22	75

Water	Cu.M/Day

Solids	M.T/Day	S.G	Cu.M/Day
Water	*	%S	*
Slurry	*	S.G	*

Portable Modular Mill	
Flotation Circuit Mass Balance Example A & B	
TRM Engineering Ltd.	
Scale	Date
G Hawthorn	Plate A – 5


4-1
Thickener & Surge Tank
To Recycle
Vent
To Grinding Circuit
50
4-4
4-3
Vacuum Pump
Filtrate Pump
15
Filtrate Disc Filter
4-2
Cake
Alt.
Overflow To Thick. Pump
3-4
Tote Bin
4-5
To Cyanidation Circuit
Belt Conveyor

23	3.6	6.4
69	25	69
92	1.22	75

23	3.6	6.4
19	55	19
42	1.67	25

23	3.6	6.4
2.6	90	2.6
26	2.89	9.0

Water Gal/Day

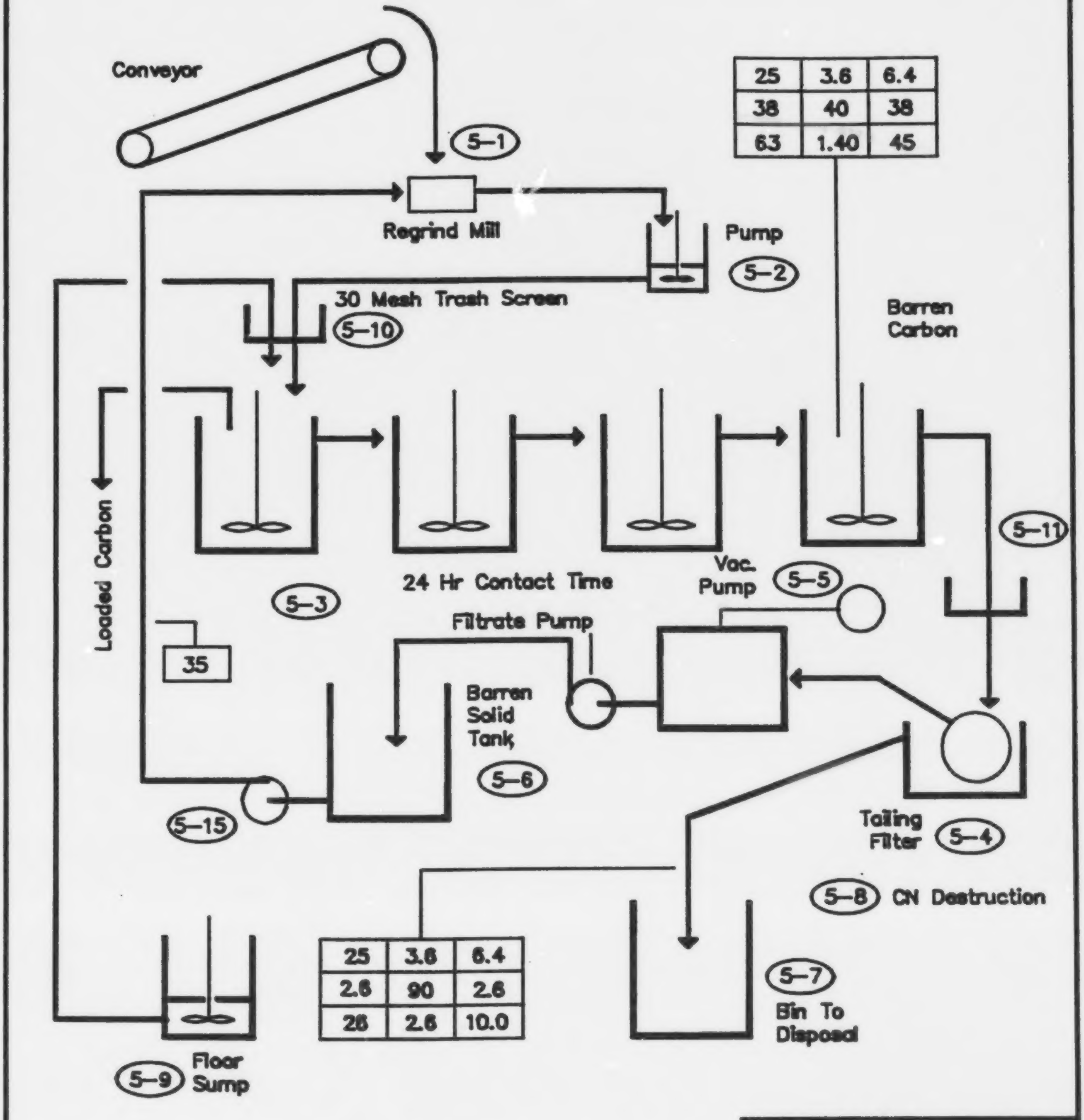
Solids	M.T/Day	S.G	Gal/Day
Water	"	%	"
Slurry	"	S.G	"

Portable Modular Mill

Flotation concentrate
Dewatering Circuit
Example A & B

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate A – 6


Conveyor
5–1
Regrind Mill
Pump
5–2
30 Mesh Trash Screen
5–10
Barren Carbon
Loaded Carbon
24 Hr Contact Time
5–3
5–11
Vac. Pump
5–5
Filtrate Pump
35
Barren Solid Tank
5–6
5–15
Tailing Filter
5–4
5–8 CN Destruction
5–7
Bin To Disposal
5–9 Floor Sump

25	3.6	6.4
38	40	38
63	1.40	45

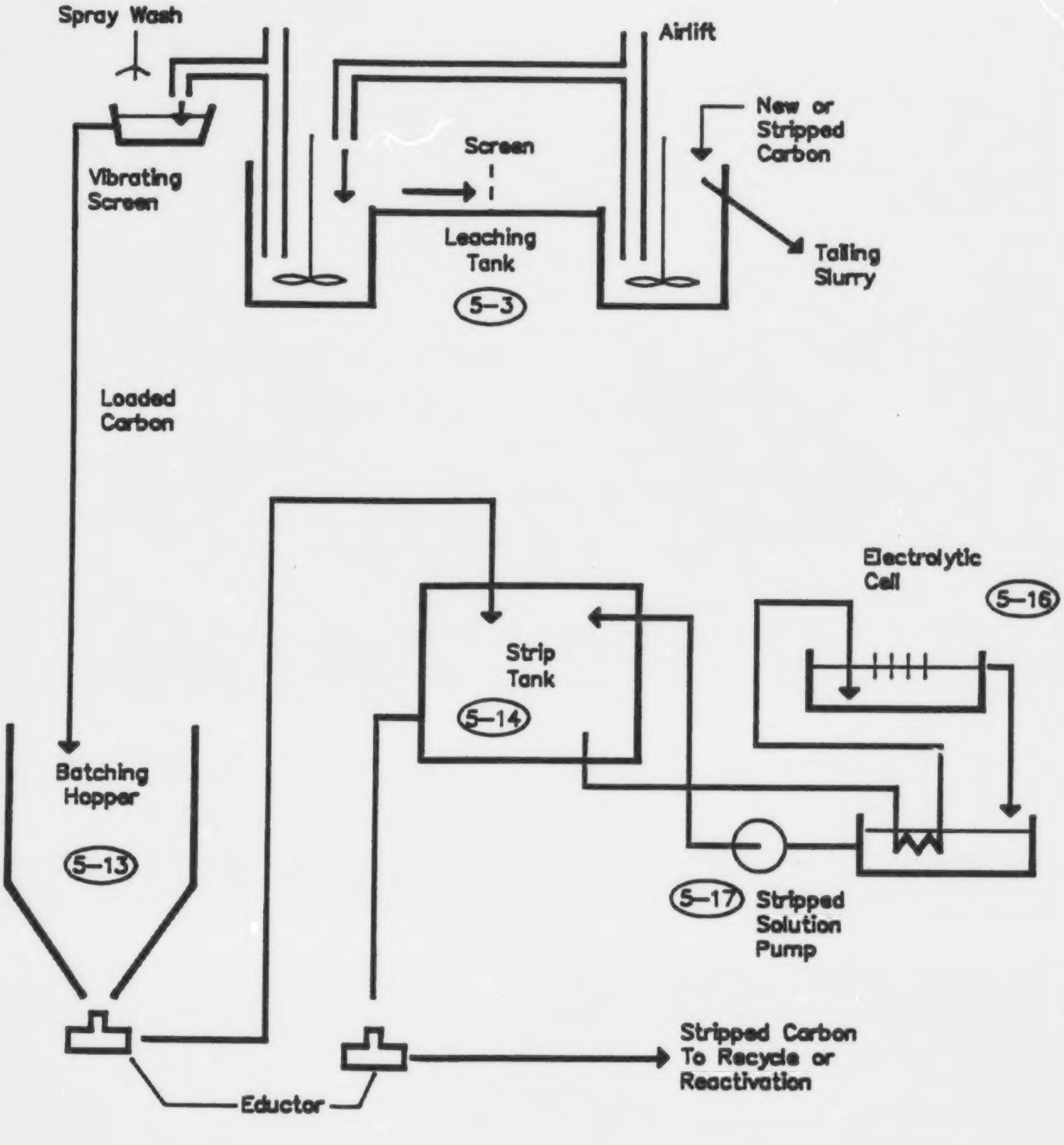
25	3.6	6.4
2.6	90	2.6
26	2.6	10.0

Portable Modular Mill

Cyanidation Circuit
Example A

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate A – 7


Spray Wash
Airlift
New or Stripped Carbon
Screen
Vibrating Screen
Leaching Tank
5–3
Tailing Slurry
Loaded Carbon
Electrolytic Cell
5–16
Strip Tank
5–14
Batching Hopper
5–13
5–17
Stripped Solution Pump
Stripped Carbon To Recycle or Reactivation
Eductor

Portable Modular Mill

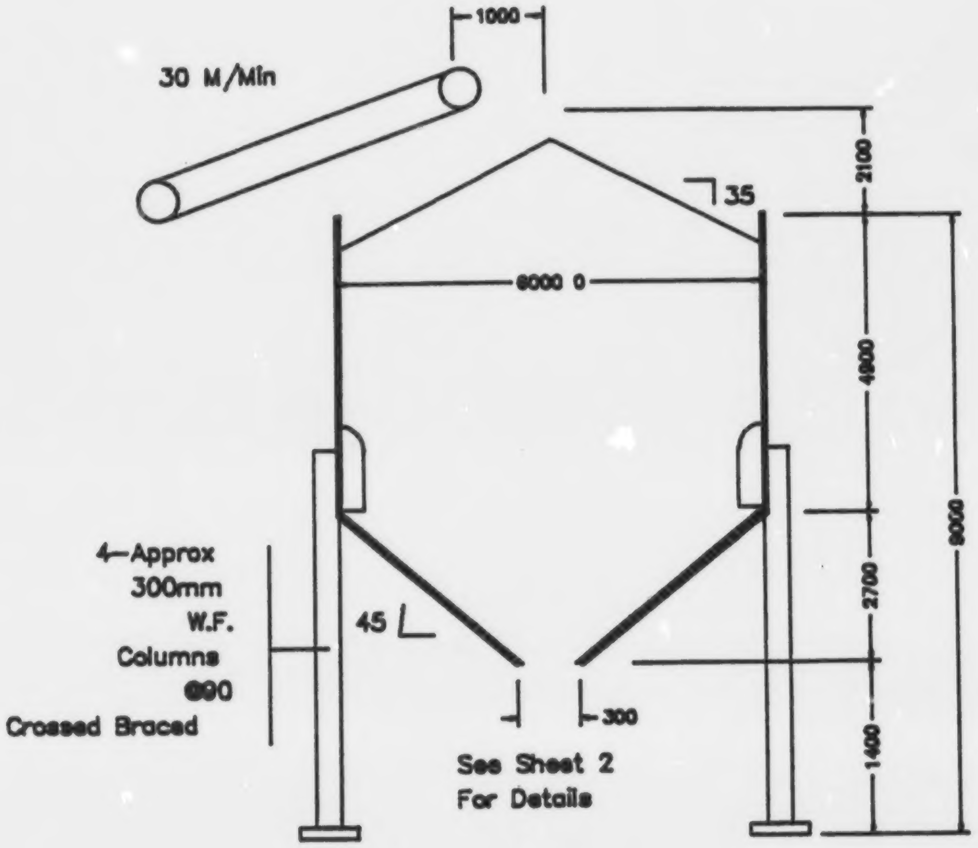
Carbon Circuit
Example A

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate A – 8

Item

1-9


1000
30 M/Min
35
2100
6000 Ø
4900
9000
2700
1400
45
300
4-Approx
300mm
W.F.
Columns
@90
Crossed Braced
See Sheet 2
For Details

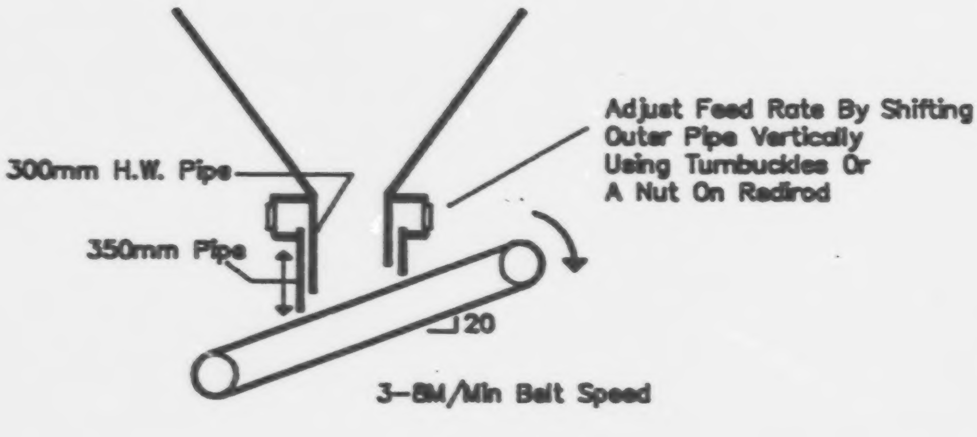
Dimensions- mm
Bin Capacity- 300 M.T.
Construction- 8mm (1/4")
Mild Steel

Portable Modular Mill

Fine Ore Bin
Sht 1 of 2 Example A

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate A - 9


Adjust Feed Rate By Shifting
Outer Pipe Vertically
Using Turnbuckles Or
A Nut On Redirod
300mm H.W. Pipe
350mm Pipe
20
3–8M/Min Belt Speed

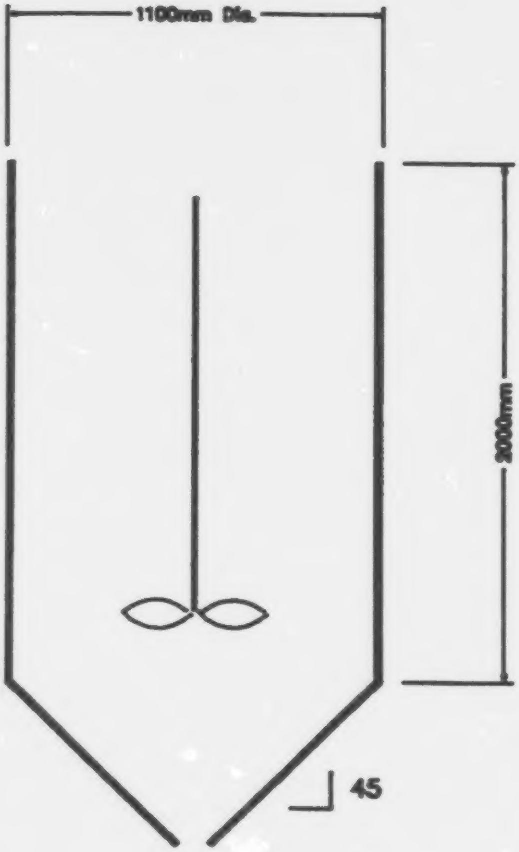
Portable Modular Mill

Fine Ore Bin
Sheet 2 of 2
Example A

TRM Engineering Ltd.

Scale	**Date**
G Hawthorn	**Plate** A – 10

Item 4-4



Diameter— Size For Solution Rise Rate Of 1.0M/Hr

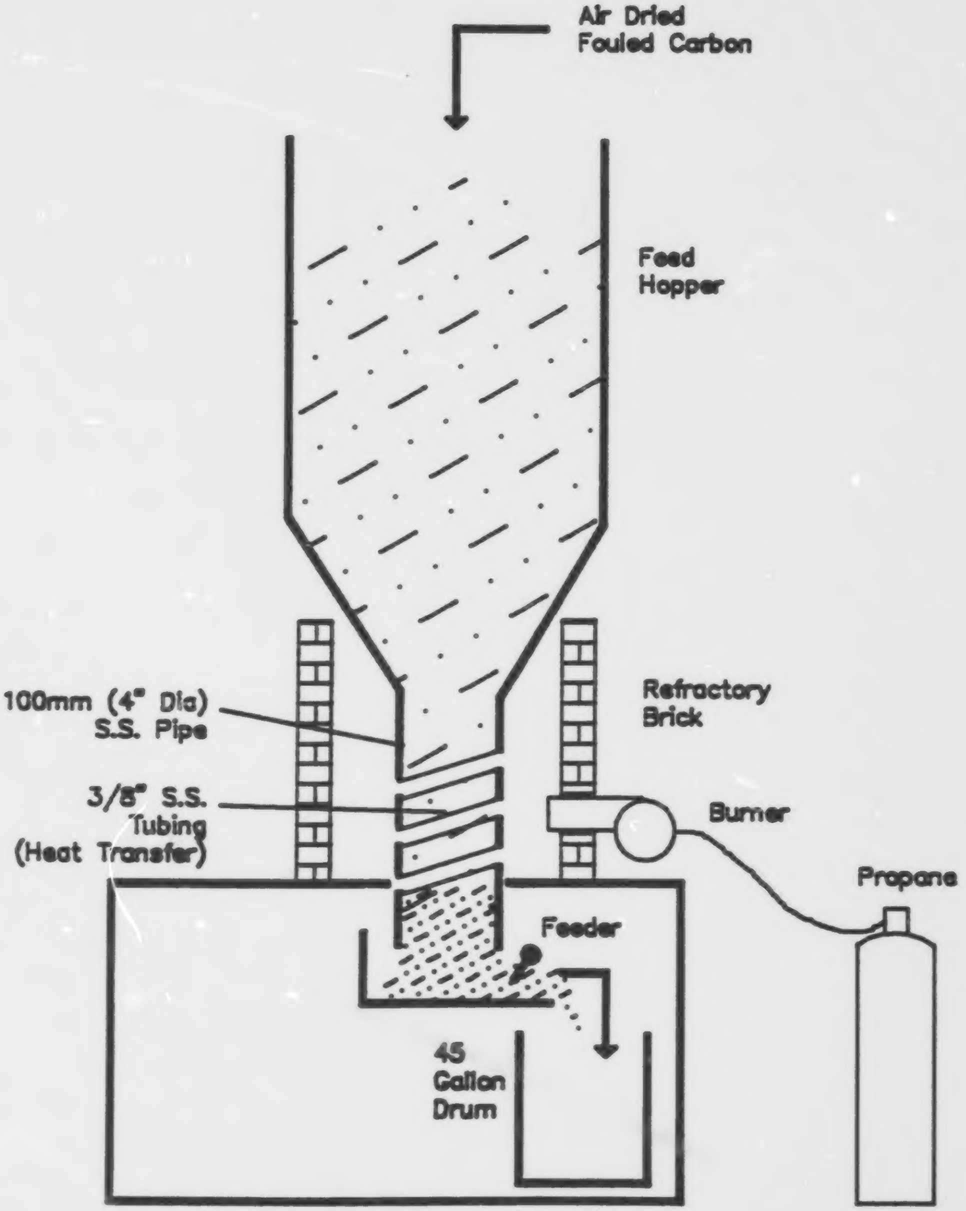
Height— Size For 4 Hr Surge Capacity Thickened Concentrate

Agitate— Slow Speed Est. 20 RPM @ 12" Dia Tip Speed 60 FPM

Weight— Tank & Agitator 1.0 M.T
—Contents 6.7 M.T

Portable Modular Mill	
Concentrate Thickener & Surge Tank Example 1	
TRM Engineering Ltd.	
Scale	Date
G [illegible]	Plate A – II

Item 5-8


Air Dried
Fouled Carbon
Feed
Hopper
100mm (4" Dia)
S.S. Pipe
Refractory
Brick
3/8" S.S.
Tubing
(Heat Transfer)
Burner
Propane
Feeder
45
Gallon
Drum

Note: Capacity
~30#/Hr

Portable Modular Mill

Carbon Reactivation
Kiln

TRM Engineering Ltd.

Scale	**Date**
G Hawthorn	**Plate** A – 12

APPENDIX B

SAMPLE PLANT "B"

-- 230 MTD (250 TPD) Au mill utilizing flotation concentration.

-- The processing plant will be constructed in truck transportable modules, and will be barged to the nearest tidewater unloading site and transported overland to the millsite.

-- The site is unusual in that the foundations from a previous operation appear competent and will be utilized as much as possible. Low fabrication costs reflect the reuse of existing foundations.

-- Captive hydro-electric power plant.

ANTICIPATED METALLURGY

Flotation

Product	Wt %	Au oz/t	Distribution
Concentrate	1.34	6.0	80.4
Flot. Tails	98.66	0.02	19.6
Feed	100.00	0.10	100.0

Primary Grind -------est 50% - 200 mesh
Concentrate Regrind ------nil

CAPITAL COST SUMMARY

ITEM	EQUIPMENT $	FABRICATION $	TOTAL $
Crushing	132,625	50,000	182,625
Grinding	71,500	70,000	141,500
Flotation	36,500	30,000	66,500
Dewatering	28,000	25,000	53,000
Elec. Substation	20,000	20,000	40,000
Elec. Distribution	20,000	20,000	40,000
Piping 4,000	4,000	8,000	
Heat and Vent	8,000	12,000	20,000
Fire Protection	4,000	4,000	8,000
Shop Tools	10,000	1,000	11,000
Building*	50,000	30,000	80,000
Foundations	-	50,000	50,000
Site Preparation	-	20,000	20,000
Assaying 35,000	15,000	50,000	
Water Supply	10,000	4,000	14,000
(A) Total Direct	427,625	308,000	787,625
Sales Tax	-	-	30,000
Barge Transportation	-	-	25,000
Design Engineering	-	-	25,000
(B) Total Indirect	-	-	80,000
(C) Total Processing	-	-	867,625
(D) Power Supply	-	-	1,800,000
(E) Total			2,667,625

* Note: Lower fabrication costs reflects the reuse of existing foundations.

* Partial cover.

CAPITAL COST DETAILS - PROCESSING EQUIPMENT

ITEM NO.	DESCRIPTION	HP	WEIGHT TONNES	$
CRUSHING				
1-1	30 tonne coarse ore bin	-	5.0	10,000
1-2	30" by 15' belt conv.	2	1.0	4,500
1-3	30" by est 50' conv.	3	2.0	6,000
1-4	15" by 24" jaw crusher	50	6.3	25,000
1-5	24" by 25' belt conv.	2	0.5	3,125
1-6	5' by 10' vib screen	10	3.1	6,000
1-7	3' cone crusher	75	11.0	40,000
1-8	24" by est 80' belt conv.	5	1.8	10,000
1-9	250 tonne fine ore bin	-	13.0	25,000
1-10	magnet	-	0.2	3,000
	Subtotal	147		132,625
GRINDING				
2-1	24" BY 15' belt conv.	2	0.5	3,000
2-2	7' by 8' ball mill	200	27.0	60,000
2-3	2 - 3" by 3" slurry pumps	20	1.0	4,000
2-4	3 - 10" cyclones	-	0.3	2,000
2-5	1.5" sump pump	5	0.3	2,500
	Subtotal	177	29.1	71,500
FLOTATION				
3-1	rougher flot machine	20	3.0	20,000
3-2	cleaner flot machine	5	0.8	5,000
3-3	flotation blower	10	0.3	2,500
3-4	1.5" slurry pump	3	0.3	2,000
3-5	2 - 2" by 2" slurry pumps	20	1.0	4,000
3-6	reagent mixing and feeders	0.5	0.3	3,000
	Subtotal	58.5	5.7	36,000
CONCENTRATE DEWATERING				
4-1	thickener - surge tank	1	1.1	4,000
4-2	6' by 2 disc filter	2	1.0	16,000
4-3	vacuum pump	15	0.5	3,000
4-4	filtrate pump	0.5	0.1	1,000
4-5	30" by 10'roller conv.	1.0	0.5	1,000
4-6	2 tonne platform scale	-	0.2	3,000
	Subtotal	19.5	3.2	28,000

ELECTRICAL POWER

Processing Plant

SERVICE	HP	KW	KWH/MONTH
Crushing	147	110	16,000 [1]
Grinding	227	169	121,700
Flotation	59	44	31,700
Dewatering	20	15	10,800
Assaying	40	30	6,500
Lighting and Misc. 110 V	30	22	(33% load) 15,800
TOTAL	523	391	203,000

[1] Operate 3 hrs/day

Grinding mill (only) - 15.6 kwh/tonne
Total Power Consumed - 29.4 kwh/tonne

OPERATING COST EXAMPLE "B"

Data:

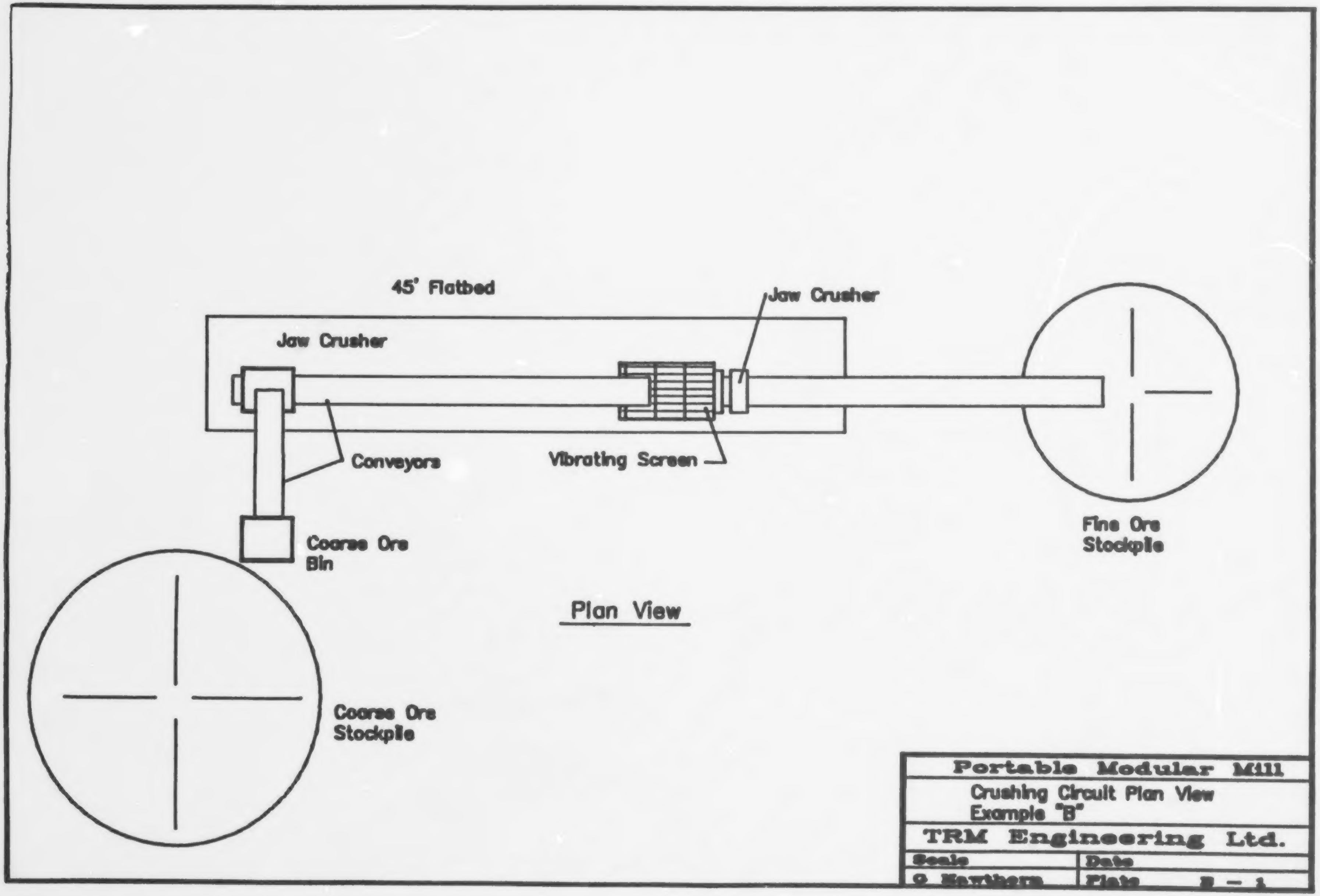
--Milling rate 230 MTD = 6900 MTM

Labour (1)	$/tonne	$/month
Supervision (mill supt)	.89	6,150
Wages - operating (6 operators)	3.78	26,100
Wages - repair	.70	4,800
Wages - assaying	.70	4,800
Wages - misc. (includes barge crew	.60	4,150
Subtotal - labour	6.67	46,000
Materials		
Liners - Crushing	.08	550
- Grinding	.16	1,100
Grinding balls	1.25	8,620
Reagents - Flotation	.20	1,380
Assaying supplies	.22	1,500
Misc maint supplies	1.00	6,900
Misc operating supplies	1.00	6,900
Subtotal	2.75	18,950
Power (captive hydro-elec plant)		
29.4 kwh/t x $.03 /kwh (2)	.88	6,080
Total	10.30	71,030

NOTE:

(1) includes direct wages + 20% benefit loading + camp costs @ $40/man day + 1 round trip flight/month to Vancouver @ $550.

(2) operating cost only --hydro-elec plant has been capitalized @ $1,800,000


45' Flatbed
Jaw Crusher
Jaw Crusher
Conveyors
Vibrating Screen
Coarse Ore
Bin
Fine Ore
Stockpile
Coarse Ore
Stockpile

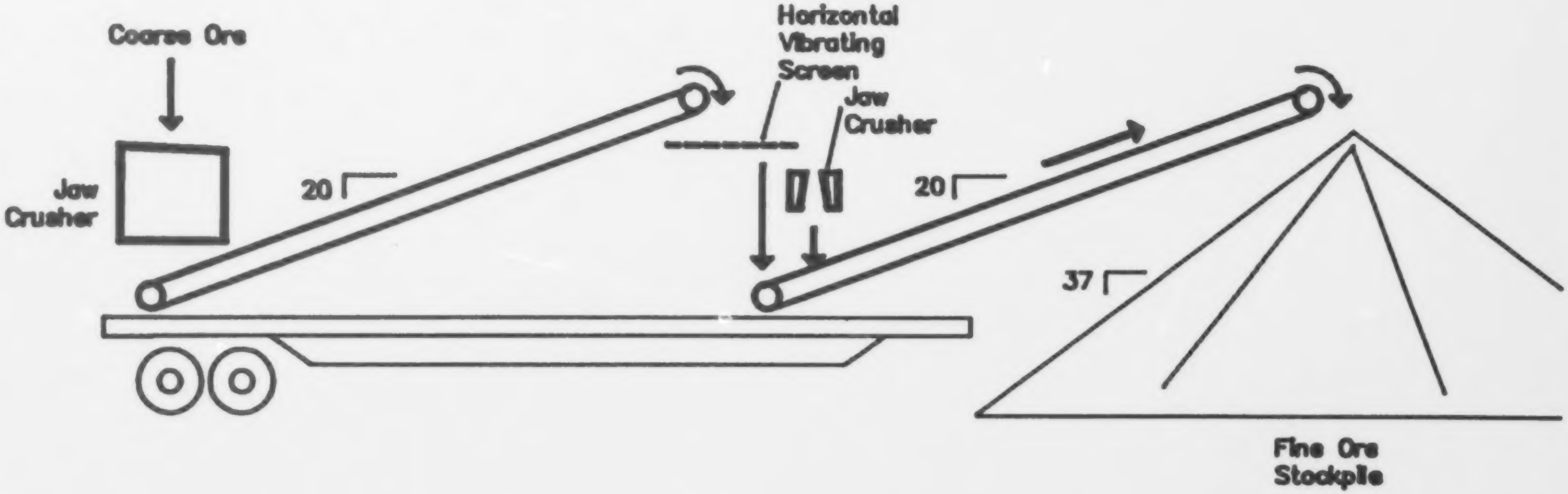
Plan View

Portable Modular Mill

Crushing Circuit Plan View
Example "B"

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate B - 1


Coarse Ore
Jaw Crusher
20
Horizontal Vibrating Screen
Jaw Crusher
20
37
Fine Ore Stockpile

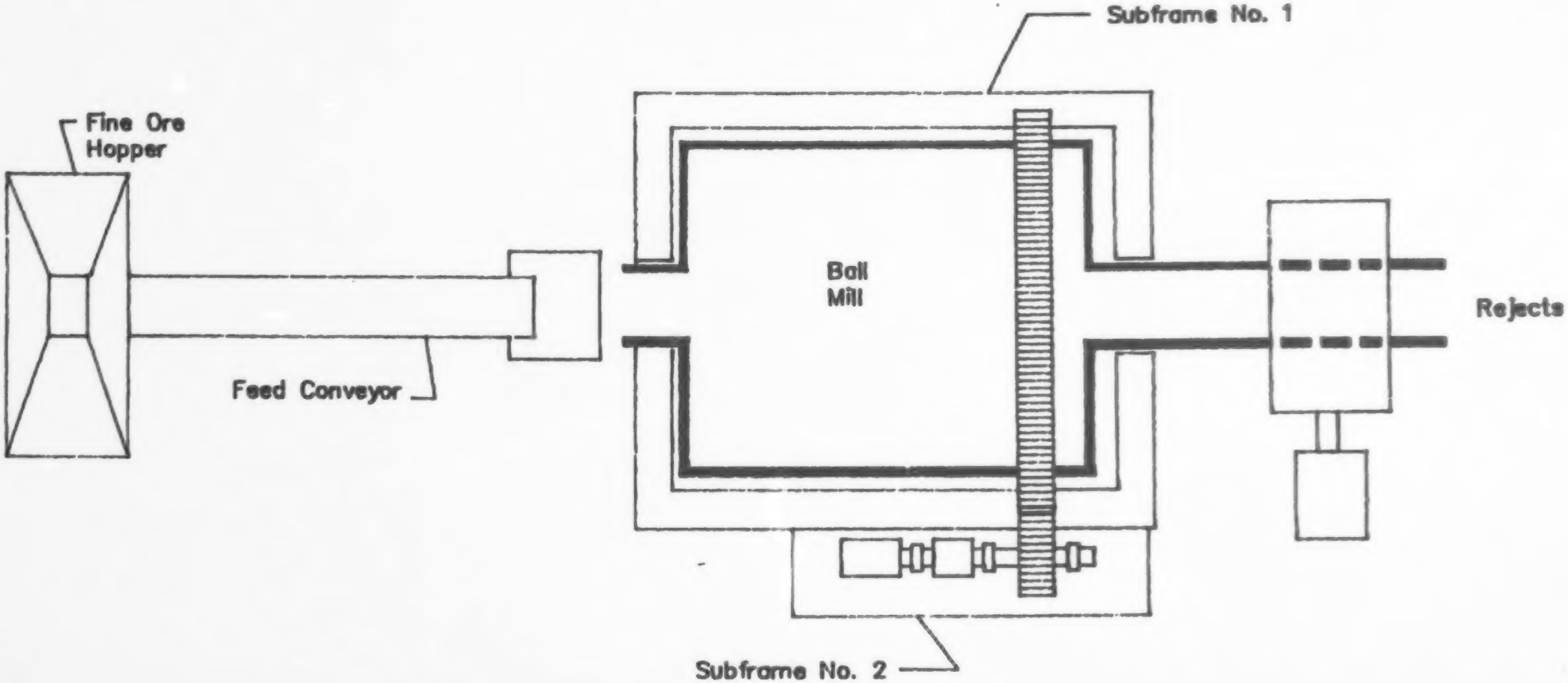
Elevation View

Portable Modular Mill

Crushing Circuit Elevation View
Example "B"

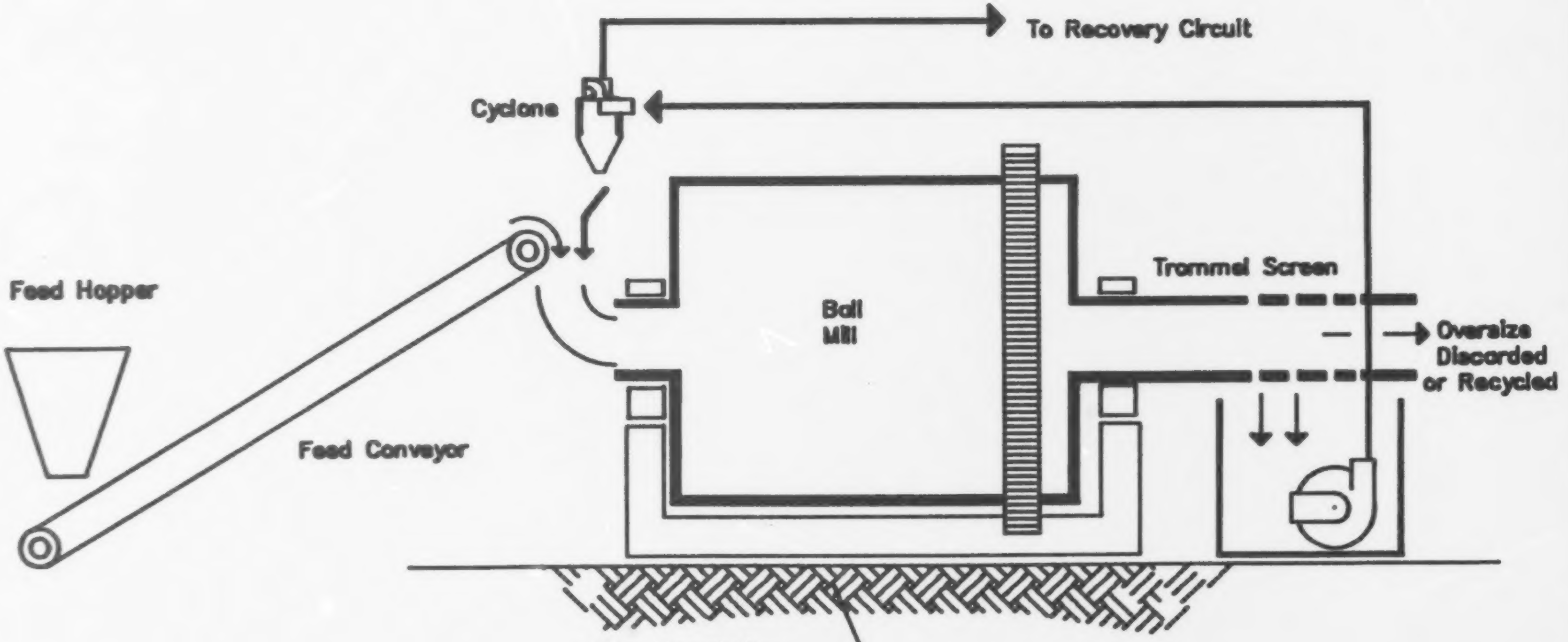
TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate B -2


Fine Ore
Hopper
Feed Conveyor
Subframe No. 1
Ball
Mill
Rejects
Subframe No. 2

Plan View

Portable Modular Mill	
Ball Mill Plan View Example "B"	
TRM Engineering Ltd.	
Scale	Date
G Hawthorn	Plate B - 1


To Recovery Circuit
Cyclone
Feed Hopper
Feed Conveyor
Ball Mill
Trommel Screen
Oversize Discarded or Recycled
Firm Foundation Typically Reinforced Monolithic Concrete

Elevation View

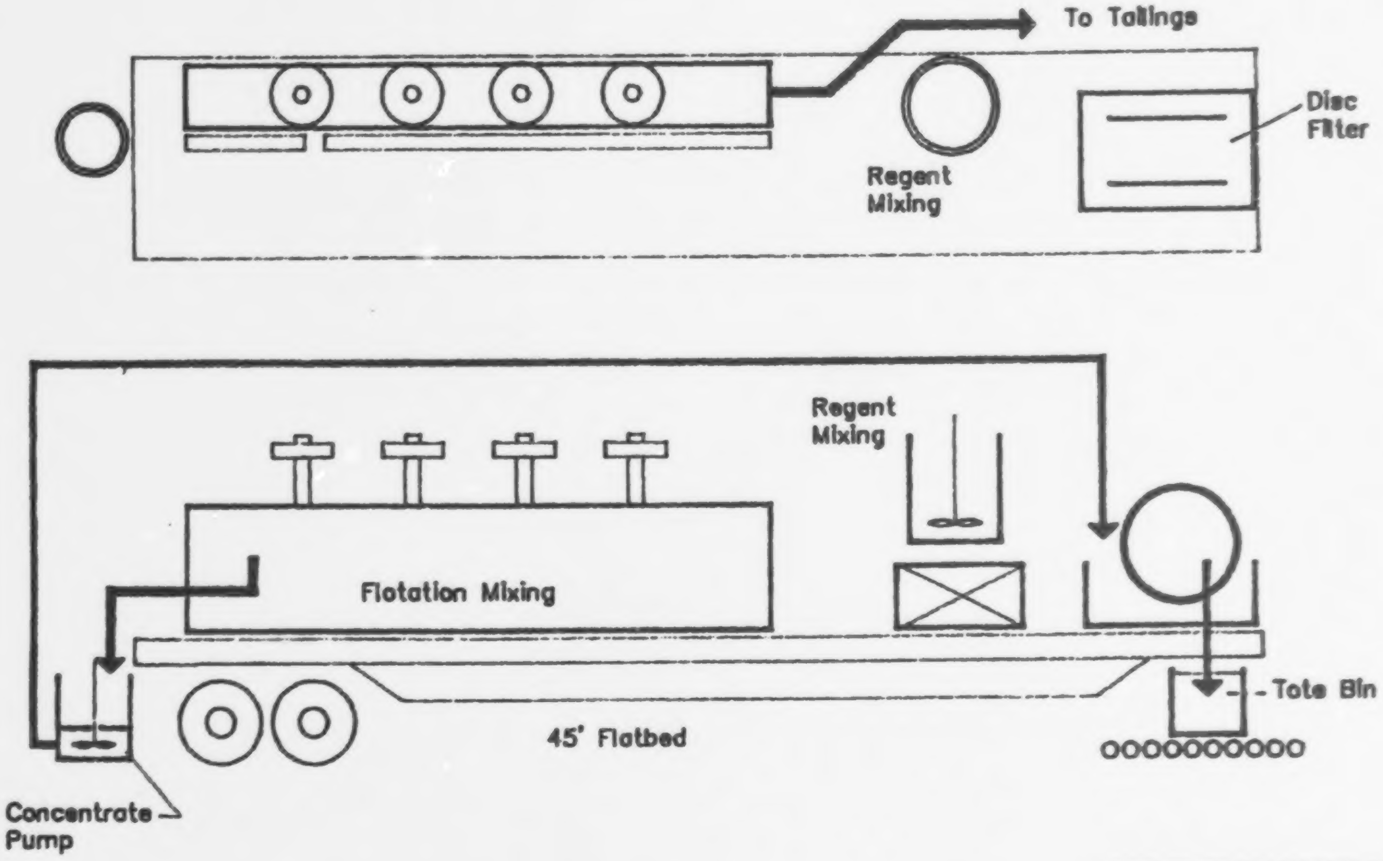
N.T.S

Portable Modular Mill

Ball Mill Elevation View
Example "B"

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate B – 4


To Tailings
Disc Filter
Regent Mixing
Regent Mixing
Flotation Mixing
Tote Bin
45' Flatbed
Concentrate Pump

Portable Modular Mill	
Flotation / Dewatering Example "B"	
TRM Engineering Ltd.	
Scale	Date
G Hawthorn	Plate B – 5

APPENDIX C

SAMPLE PLANT "C"

- 70 MTD (75 TPD) Au mill utilizing flotation concentration followed by cyanidation of the flotation concentrate. Direct electrowinning of pregnant solution will be utilized.
- Processing plant is barge mounted.
- Power is supplied through B.C. Hydro grid.

ANTICIPATED METALLURGY

Flotation

Product	Wt %	Au oz/t	Distribution	
			Circuit	Overall
Concentrate	2.6	18.	95.1	95.1
Flot. Tails	97.4	0.025	4.9	4.9
Feed	100.0	0.50	100.0	100.0

Cyanidation

Product	Wt %	Au oz/t	Circuit	Overall
Bullion	-	-	96.7	92.0
Leach Tails	2.6	0.60	3.3	3.1
Flot Conc.	2.6	18.	100.0	95.1

Primary grind ----------50% - 200 mesh

Regrinding--------------nil

CAPITAL COST SUMMARY

Item	Equipment $	Installation $	Total $
Barge	100,000	-	100,000
Crushing	107,625	40,000	147,625
Grinding	46,500	30,000	76,500
Flotation	30,000	15,000	45,000
Dewatering	21,000	20,000	41,000
Cyanidation	60,000	20,000	80,000
Elec. Substation(1)	30,000*	20,000	50,000
Elec. Distribution	20,000	20,000	40,000
Piping	4,000	4,000	8,000
Heat and Vent	8,000	12,000	20,000
Fire Protection	4,000	4,000	8,000
Shop Tools	10,000	1,000	11,000
Building Roof	20,000	30,000	50,000
Assaying	35,000	15,000	50,000
Water Supply	10,000	4,000	14,000
(A) Total Direct	506,125	235,000	741,125
Sales Tax	-	-	35,000
Prepare Moorage	-	-	50,000
Transport Barge	-	-	25,000
Design Engineering	-	-	25,000
(B) Total Indirect	50,000	10,000	135,000
Total			876,125

(1) Includes the cost of the electrical distribution panel.

CAPITAL COST DETAILS - PROCESSING EQUIPMENT

CRUSHING

ITEM NO.	DESCRIPTION	HP	WEIGHT TONNES	$
1-1	20 tonne coarse ore bin	--	5.0	10,000
1-2	30" by 15' belt conv.	2	1.0	4,500
1-3	30" by est. 50' conv.	3	2.0	6,000
1-4	15" by 24" jaw crusher	50	6.3	25,000
1-5	24" by 25' belt conv.	2	0.5	3,125
1-6	5' by 10' vib screen	10	3.1	6,000
1-7	2' cone crusher	30	4.5	25,000
1-8	24" by est 80' belt conv.	5	1.8	10,000
1-9	100 tonne fine ore bin	-	6.0	15,000
1-10	magnet	-	0.2	3,000
	Subtotal	102	30.4	107,625
GRINDING				
2-1	24" by 15' belt conv.	2	0.5	3,000
2-2	5' by 6' ball mill	60	13.0	35,000
2-3	2 - 2" by 2" slurry pumps	10	1.0	4,000
2-4	3 - 6" cyclones	-	0.3	2,000
2-5	1.5" sump pump	5	0.3	2,500
	Subtotal	77	15.1	46,000
FLOTATION				
3-1	rougher flot machine	10	3.0	15,000
3-2	cleaner flot machine	5	0.8	5,000
3-3	flotation blower	5	0.3	1,800
3-4	1.5" slurry pump	3	0.3	2,000
3-5	2 - 2" by 2" slurry pumps	10	1.0	4,000
3-6	reagent mixing & feeders	0.5	0.3	3,000
	Subtotal	33.5	5.7	30,000
CONCENTRATE DEWATERING				
4-1	thickener - surge tank	1	1.1	4,000
4-2	4' disc filter	2	1.0	12,000
4-3	vacuum pump	5	0.5	2,000
4-4	filtrate pump	0.5	0.1	1,000
4-5	18" by 10' belt conv.	1	0.5	2,000
	Subtotal	9.5	3.2	21,000

ITEM NO.	DESCRIPTION	HP	WEIGHT TONNES	$
CYANIDATION				
5-1	regrind mill	5	0.5	10,000
5-2	1.5" slurry pump	1	0.3	2,000
5-3A	4 - 4' by 4' leach tanks	-	0.8	2,000
5-3B	4 - agitators	8	0.4	8,000
5-4	4' disc filter	2	0.7	12,000
5-5	vacuum pump	7.5	0.2	2,500
5-6	barren soln. tank	-	0.2	500
5-7	low pressure blower	3	0.1	2,000
5-8	cyanide destruction	1	0.3	5,000
5-9	1.5" sump pump	2	0.3	2,500
5-15	2 - barren soln. pumps	1	0.1	2,000
5-16	electrolytic cell cw. rectifier	1	0.2	10,000
5-17	settling tanks	-	0.1	1,500
	Subtotal	31.5	4.1	60,000

ELECTRICAL POWER

Processing Plant

SERVICE	HP	KW	KWH/MONTH
Crushing	102	76	6,800 1
Grinding	77	57	41,000
Flotation	33.5	25	18,700
Dewatering	9.5	7	5,000
Cyanidation	31.5	23	27,500
Assaying	40	30	6,500 2
Lighting and Misc. 110 V	10	7	5,000
TOTAL	303.5	226	109,800

1 Operate 3 hrs/day

2 33% load

Grinding power only - 17.9 kwh/tonne
Total Power Consumed - 52.2 kwh/tonne

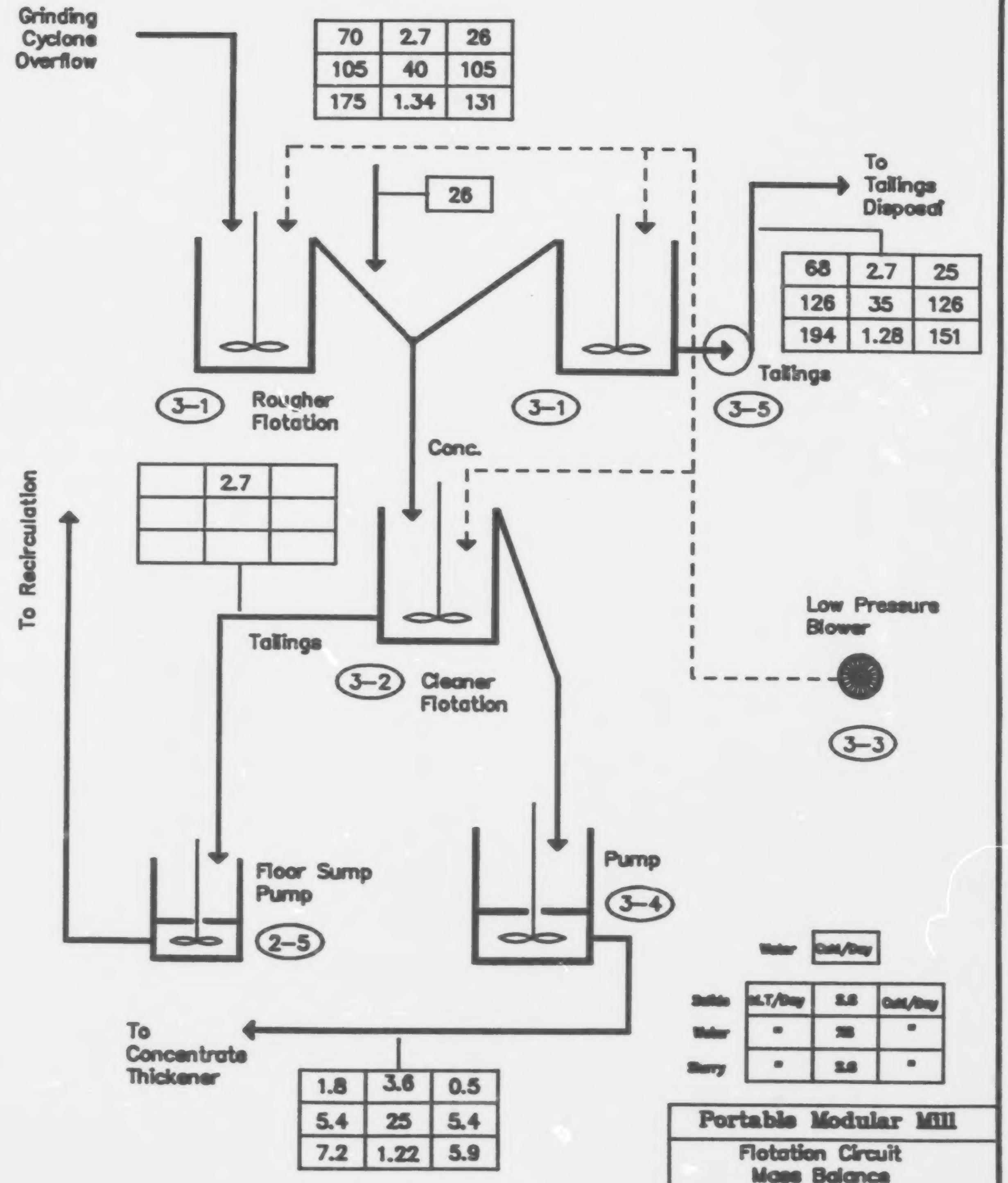
OPERATING COSTS - EXAMPLE "C"

Data:
--Milling rate 70 MTD = 2100 MTM

Labour (1)	$/tonne	$/month
Supervision (mill supt)	1.92	4,025
Wages - operating (6 operators)	7.09	14,900
Wages - repair	1.19	2,500
Wages - assaying	1.19	2,500
Subtotal - labour	11.39	23,925
Materials		
Liners - Crushing	.12	250
- Grinding	.18	400
Grinding Balls	1.43	3,000
Reagents - Flotation	.20	420
- Cyanidation	1.76	3,700
- Cyanide destruction	.28	600
- Smelting	.05	350
Assaying supplies	.22	1,500
Misc. maint. supplies	1.00	6,900
Misc. operating supplies	1.00	6,900
Subtotal - materials	6.24	13,100
Power (purchased power)		
52.2 kwh/t x $0.04/kwh	2.09	4,380
Total	19.72	41,405

NOTE:

(1) Includes direct wages + 15% benefit loading.


Grinding Cyclone Overflow
26
To Tailings Disposal
Tailings
3-1
Rougher Flotation
3-1
3-5
Conc.
To Recirculation
Tailings
3-2
Cleaner Flotation
Low Pressure Blower
3-3
Floor Sump Pump
2-5
Pump
3-4
To Concentrate Thickener

70	2.7	26
105	40	105
175	1.34	131

68	2.7	25
126	35	126
194	1.28	151

	2.7	

1.8	3.6	0.5
5.4	25	5.4
7.2	1.22	5.9

Water | Cu.M/Day

Solids	M.T/Day	S.G	Cu.M/Day
Water	*	%S	*
Slurry	*	S.G	*

Portable Modular Mill

Flotation Circuit
Mass Balance
Example C

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate C – 1

APPENDIX D

MODULAR CONSTRUCTED PROCESSING PLANT

This section contains detailed data on truck transportable milling plants.

Sufficient data is presented that a prospective mine operator, on completion of metallurgical testing and flowsheet development, can select the modules which will be required for a 50 or 100 tpd plant.

Other production rates can be satisfied by using the contained data and ratioing costs.

Operating Cost

The operating cost data for the 70 tpd barge-mounted flotation/cyanidation concentrator (see Appendix C, page 199) is typical of small concentration and should be used to determine the cost of operating the selected plant.

The following points are noteworthy and are of general application:

-- The operating cost of a diesel-electric power plant is almost entirely fuel cost dependant. Fuel consumption of a well operated plant will be approximately 3.4 kwh/l.

-- A typical well designed, small capacity flotation or straight cyanidation concentrator can be operated by a single operator on each shift. An additional operator on day shift only will be required for the cyanidation plant.

-- A single operator on day shift will be required to operate the crushing plant.

-- The maintenance requirements of a well designed small plant are frequently satisfied by a single, versatile millright.

-- Flotation concentrating plants can be started up and shut down in approximately 1/2 hour and with little loss of product. This may be attracative at a site which lends itself to a Monday-Friday operation.

-- Cyanidation plants, if they are to be shut down for weekends, require at least a watchman, due to the high value of intermediate products, and the ease of theft.

-- The chemical consumption in a cyanidation plant will need to be determined in the laboratory. Cyanide consumption and cyanide destruction costs are site specific and can represent a significant operating cost.

-- The consumption of grinding balls is typically .15-.20 #/kwh of mill power consumption.

-- The consumption of grinding mill metal liners is typically .020 #/kwh.

-- Flotation reagent costs are typically less than $.20/t.

MODULAR MILL - CAPITAL COST SUMMARY

MODULE	CAPACITY	$ EQUIPMENT	$ FABRICATION	$ TOTAL
Crushing	6 TPH	44,000	15,000	59,000
Grinding	50 TPD	37,800	15,000	52,800
	100 TPD	59,600	30,000	89,600
Gravity	150 TPD	9,400	3,000	12,400
Flotation	50 TPD	11,800	3,000	14,800
	100 TPD	21,800	3,000	24,800
Reagent Mixing & Feeding	100 TPD	2,000	--	2,000
Concentrate Dewatering	12 TPD	17,300	10,000	27,300
Leaching	12 TPD Flot. Conc.	52,400	15,000	67,400
	50 TPD	47,000	20,000	67,000
	100 TPD	81,500	20,000	101,500
Carbon Stripping & Electrowin	40 OZ/DAY Au + Ag	8,800	2,000	10,800
Carbon Reactivation	200 #/8 HR	3,000	2,000	5,000

To the above add the following:

1. Diesel Electric Generators

   Typically $40,000/250 kw

2. Trailers (S&D 45' Highway Units)

   Typically $5,000 each used

3. Electrical Switchgear and Cable @ $500/Motor (except for the ball mill drive which may cost $5,000).

4. Haulage @ estimated $2,000/trailer.

5. Fuel storage.

6. Assay office @ estimated $40,000 for a fire assay facility (Au and Ag).

7. Tailing disposal.

8. Water supply system.

9. Cyanide destruction, if applicable.

EQUIPMENT COSTS - DETAILS

MODULE	PRODUCTION RATE	EQUIPMENT	HP	WT. #	$
Crushing	6 TPH	Coarse Ore Bin	—	4,000	6,000
	"	Coarse Ore Feeder	3	2,000	3,500
	"	#1 Jaw Crusher (8" x 10")	10	2,300	8,500
	"	3 Conveyors (18" x 100' total)	6	10,000	15,000
	"	#2 Jaw Crusher (8" x 10")	10	2,300	8,500
	"	Vibrating Screen (2.5' x 5')	3	600	2,500
		SUB-TOTAL	32	21,200	44,000
Grinding	50 TPD	Feed Conveyor (18" x 15')	1	1,500	2,500
	"	Ball Mill (5' x 5')	50	18,000	30,000
	"	Slurry Pump (2" x 2")	2	800	2,000
	"	Cyclone (6")	—	200	800
	"	Ball Mill Change	—	7,000	2,500
		SUB-TOTAL	53	27,320	37,800
Grinding	100 TPD	Feed Conveyor (18" x 15')	1	1,500	2,500
	"	Ball Mill (6' x 5')	100	36,000	50,000
	"	Slurry Pump (3" x 3")	5	800	2,500
	"	Cyclone (10")	—	200	800
	"	Ball Mill Change	—	11,000	3,800
		SUB-TOTAL	106	49,500	59,600
Gravity	UP TO 150 TPD	Duplex Jig (12" x 18")	1	1,800	6,500
		Feed Hopper	—	500	1,000
	"	Table (2' x 4')	0.5	300	1,900
		SUB-TOTAL	1.5	2,600	9,400
Flotation	50 TPD	Flotation Machine (2 m³)	10	6,000	10,000
	"	4 Cell Includes Cleaner			
	"	Pump	1	300	1,800
		SUB-TOTAL	11	6,300	11,800
Flotation	100 TPD	Flotation Machine (4-5 m³)	15	10,000	20,000
	"	4 Cells Includes Cleaner			
	"	Pump	1	300	1,800
		SUB-TOTAL	16	10,300	21,800

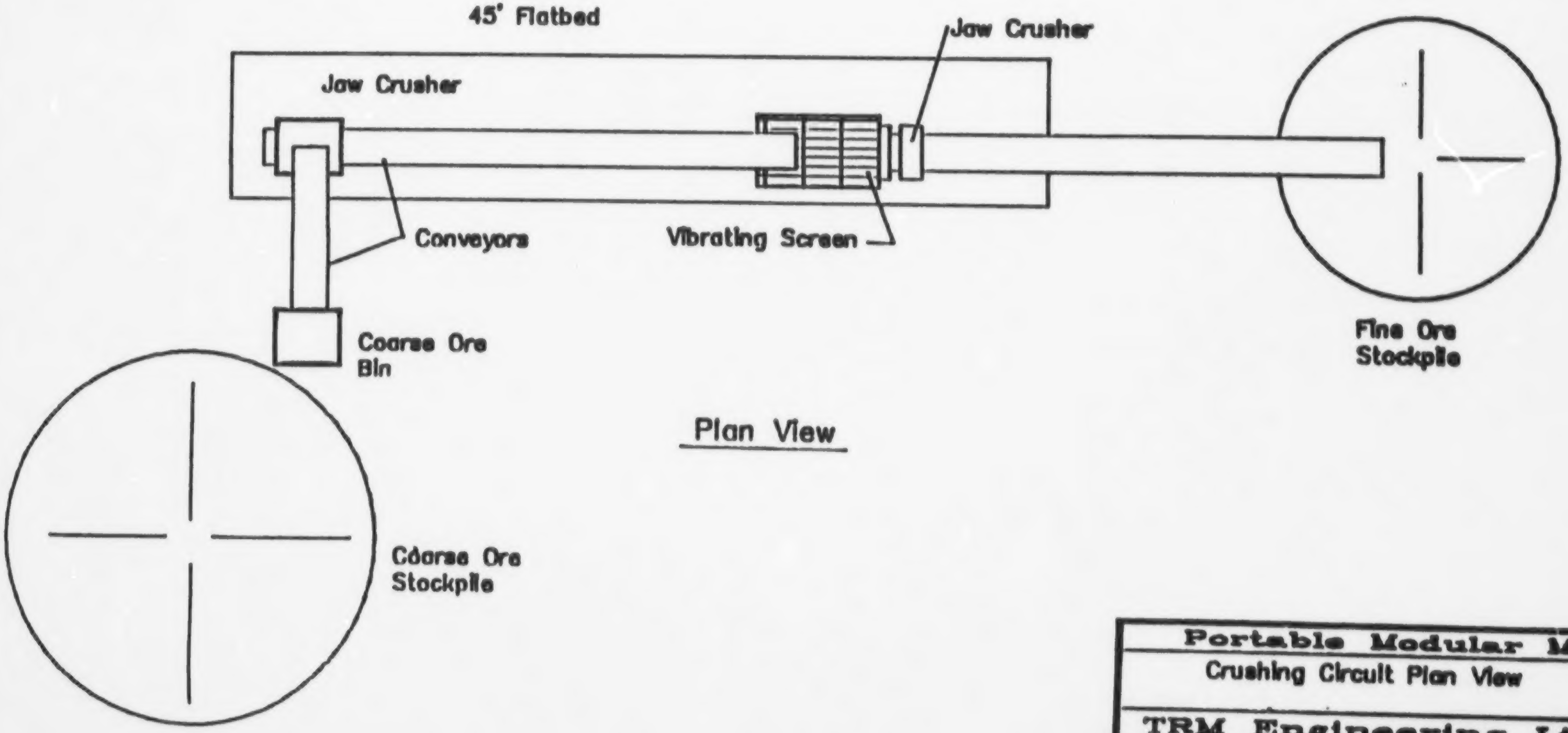
MODULE	PRODUCTION RATE	EQUIPMENT	HP	WT. #	$
Reagents	50 & 100 TPD	2 Clarkson Feeders	0.5		1,500
		Reagent Mixing Tank	0.5	500	500
		SUB-TOTAL	1	500	2,000
Concentrate Dewatering	12 TPD FLOT. CONC.	Settling Cone (1 M0)	0.5	2,000	2,500
		Disc Filter (4'0 x 2 disc)	1	3,000	12,000
		Vacuum Pump (250 cfm)	5	800	2,800
		SUB-TOTAL	6.5	5,800	17,300
Leaching	12 TPD FLOT. CONC.	Conveyor (18" x 10')	1	1,500	2,000
		Regrind Mix (250 cfm)	5	1,200	8,000
		Leaching Tanks (4-6'0 x 6')*	—	2,400	2,800
	"	Agitators (4 @ 3 HP)**	—	1,600	12,000
	"	Screens (2 - 18"0)	0.5	200	5,500
	"	Pumps (2 Slurry)	2	600	3,600
	"	Blower	3	500	2,500
	"	Solid Tank & Pump	0.5	900	1,200
	"	Disc Filter (4'0 x 2 disc)	1	3,000	12,000
	"	Vacuum Pump	5	800	2,800
		SUB-TOTAL	9.5	11,700	52,400

* 24 hour contact time.
** 0.5 HP/m³.

MODULE	PRODUCTION RATE	EQUIPMENT	HP	WT. #	$
Leaching	50 TPD "	Leaching Tanks (4 @ 10'0 x 10')	—	18,000	18,000
	" "	Agitators* (4 @ 5 HP)	20	6,000	20,000
	"	Screens	0.5	200	5,500
	"	Blower	10	1,500	3,500
		SUB-TOTAL	30.5	25,700	47,000
Leaching	100 TPD "	Leaching Tanks (5 @ 12'0 x 12' High)	—	35,000	35,000
	" "	Agitators* (5 @ 7.5 HP)	42.5	10,000	35,000
	"	Screens (2 - 18")	0.5	200	5,500
	"	Blower	20	2,000	6,000
		SUB-TOTAL	63	47,200	81,500

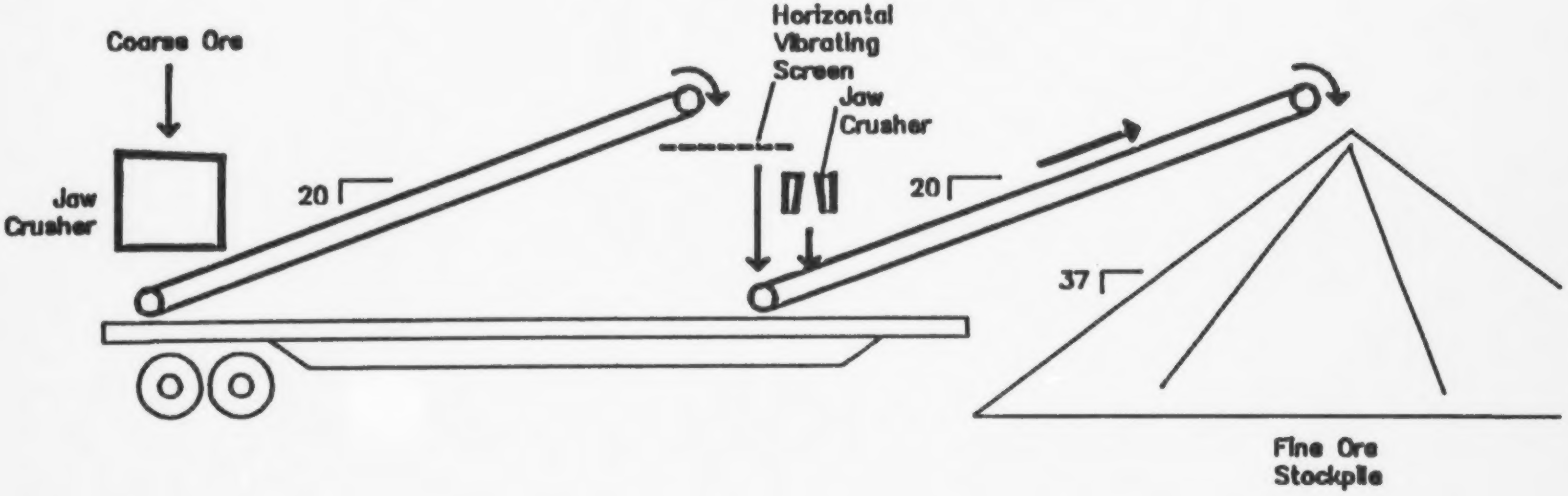
* 0.25 HP/m³.

MODULE	PRODUCTION RATE	EQUIPMENT	HP	WT. #	$
Carbon Stripping & Electrowin	40 oz/DAY Au + Ag	Stripping Vessel	—	400	2,000
	"	Strip Solution Tank	—	400	500
	"	Electric Heaters	16	100	1,500
	"	Circ. Pump	0.5	50	400
	"	Specialty Valving	—	—	600
	"	Electrolytic Cell	—	100	3,000
	"	Rectifier	0.5	50	800
		SUB-TOTAL	17	1,100	8,800
Carbon Reactivation Kiln	200 #/CARBON IN 8 HR		(Propane)	1,000	3,000
		SUB-TOTAL		1,000	3,000


45' Flatbed
Jaw Crusher
Jaw Crusher
Conveyors
Vibrating Screen
Coarse Ore Bin
Fine Ore Stockpile
Coarse Ore Stockpile

Plan View

Portable Modular Mill
Crushing Circuit Plan View
TRM Engineering Ltd.
Scale
Date
G Hawthorn
Plate 0 – 1


Coarse Ore
Jaw Crusher
20
Horizontal Vibrating Screen
Jaw Crusher
20
37
Fine Ore Stockpile

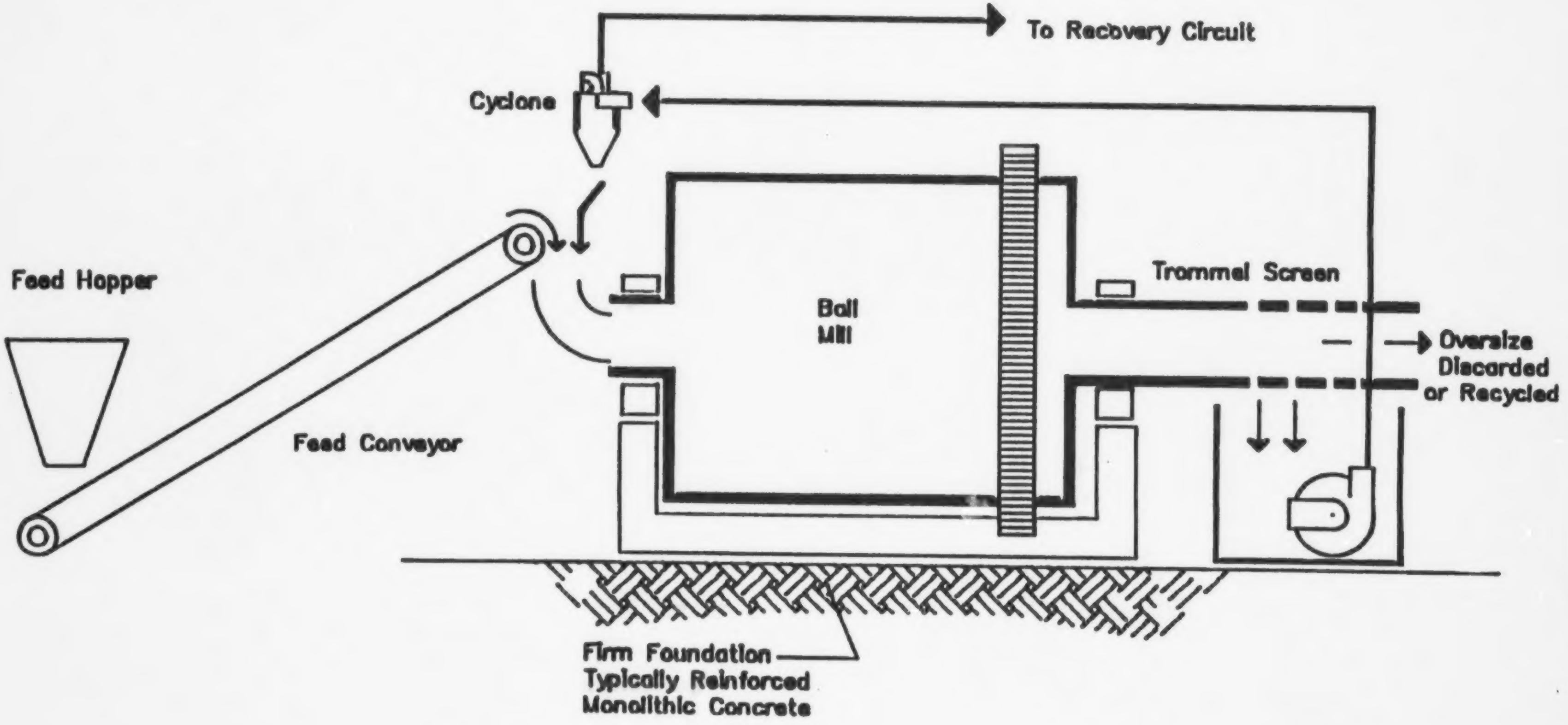
Elevation View

Portable Modular Mill

Crushing Circuit Elevation View

TRM Engineering Ltd.

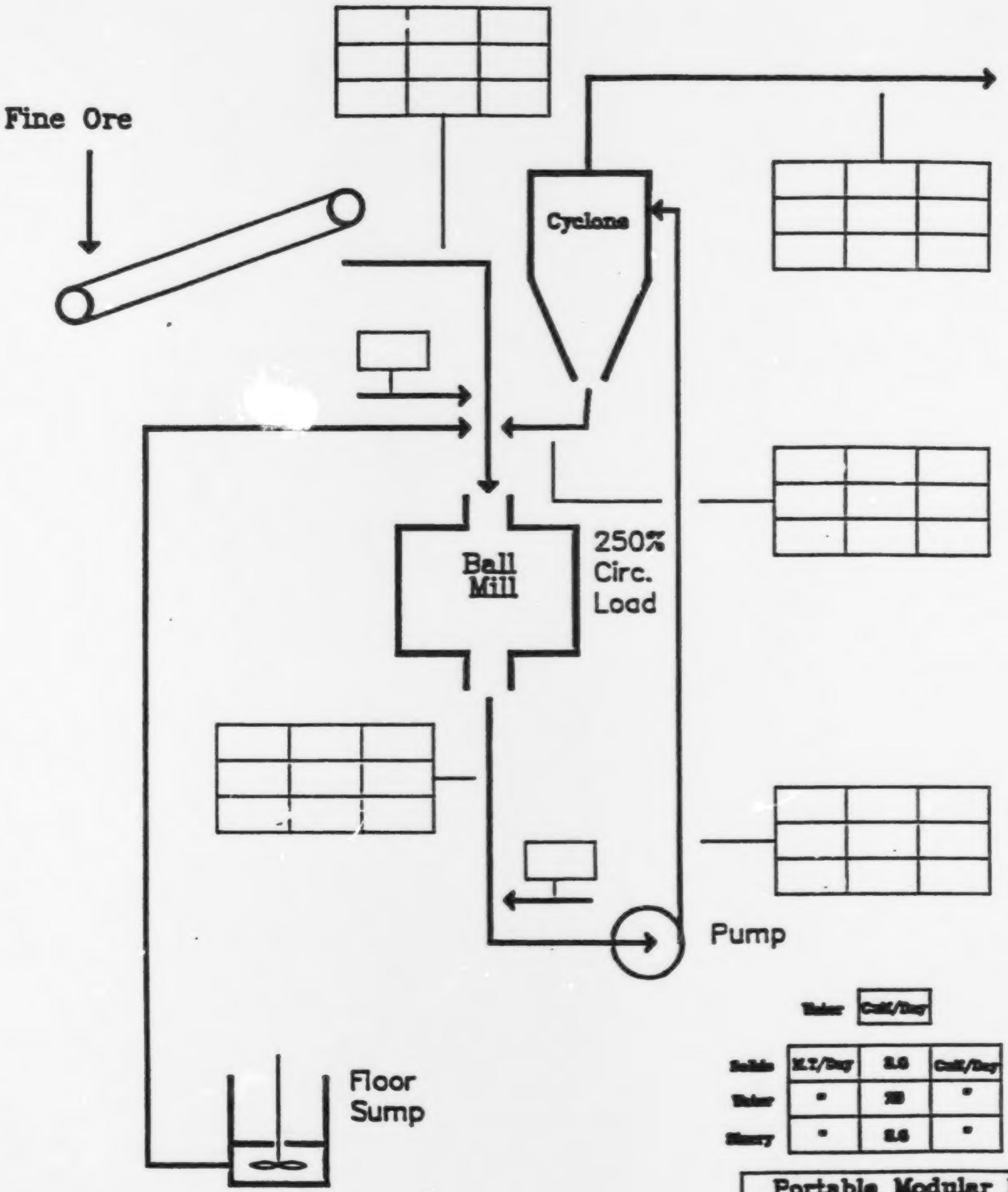
Scale	Date
G Hawthorn	Plate 0 – 2


To Recovery Circuit
Cyclone
Feed Hopper
Ball
Mill
Trommel Screen
Oversize
Discarded
or Recycled
Feed Conveyor
Firm Foundation
Typically Reinforced
Monolithic Concrete

Elevation View

N.T.S

Portable Modular Mill	
Ball Mill Elevation View	
TRM Engineering Ltd.	
Scale	Date
G Hawthorn	Plate D-4

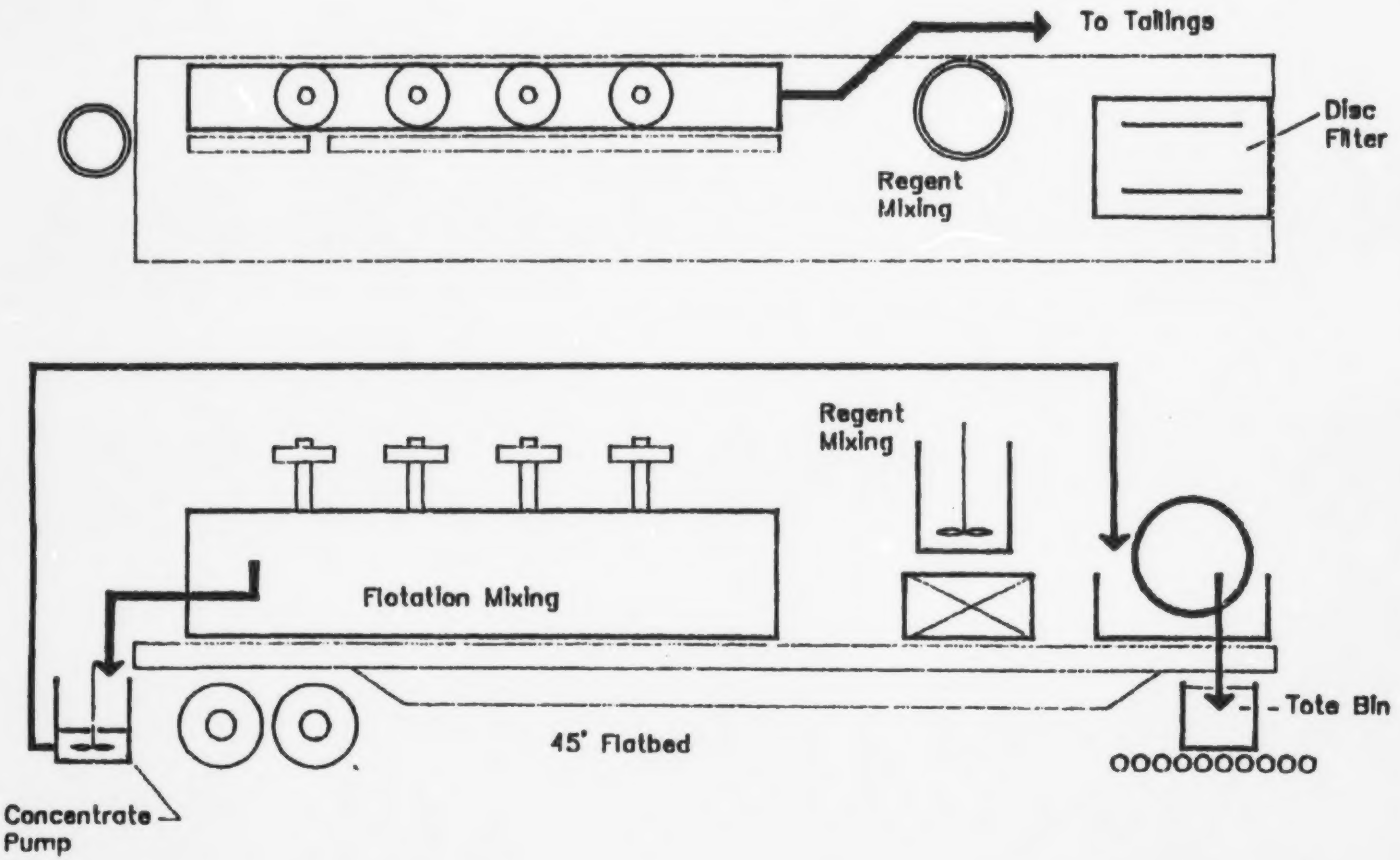

Fine Ore
Cyclone
Ball Mill
250% Circ. Load
Pump
Floor Sump
Water CuM/Day
Solids M.T/Day S.G CuM/Day
Water " %S "
Slurry " S.G "

Portable Modular Mill

Grinding Circuit

TRM Engineering Ltd.

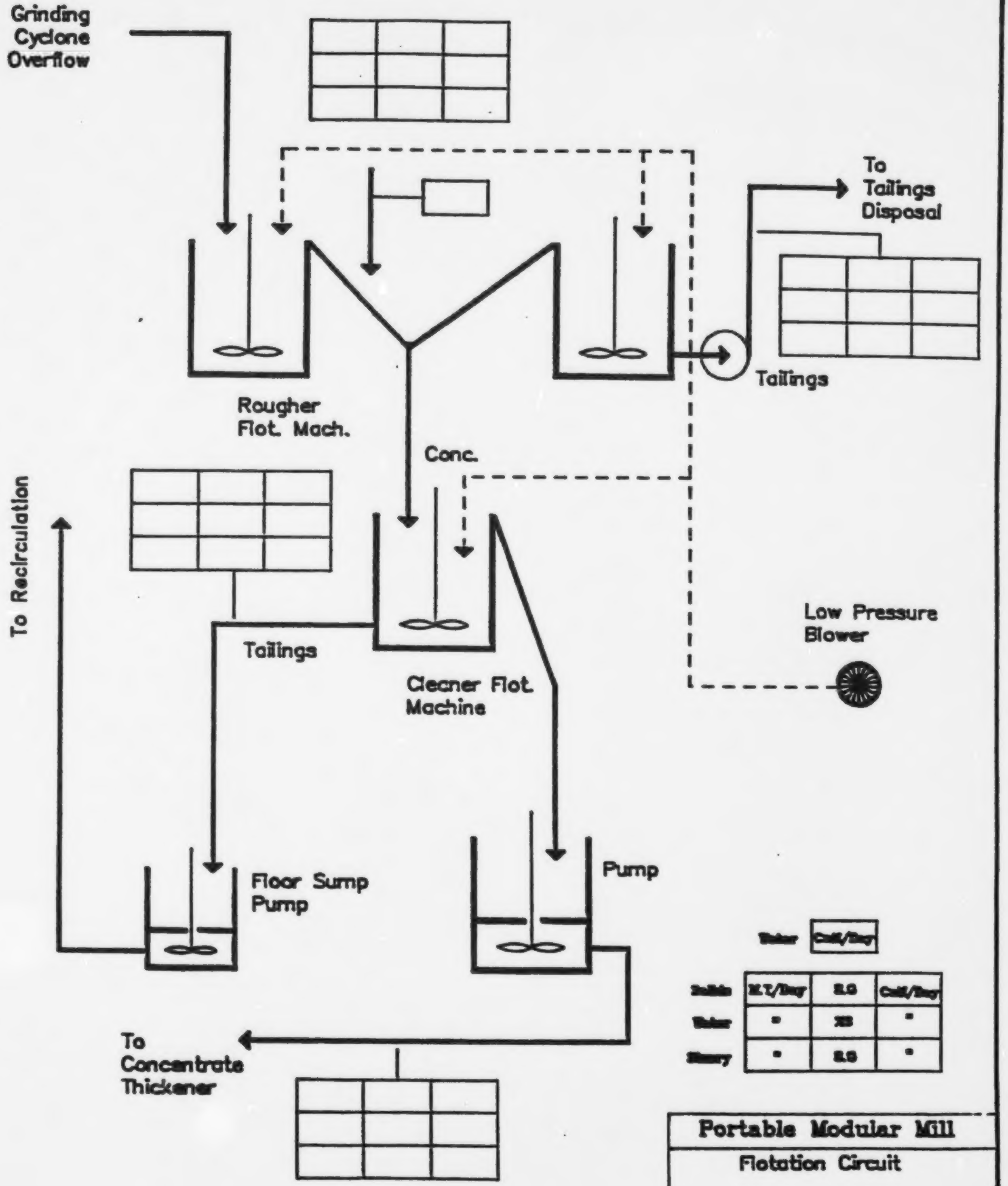
Scale	Date
G Hawthorn	Plate D-6


To Tailings
Disc Filter
Regent Mixing
Regent Mixing
Flotation Mixing
Tote Bin
0000000000
45' Flatbed
Concentrate Pump

Portable Modular Mill
Flotation / Dewatering

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate D – 5

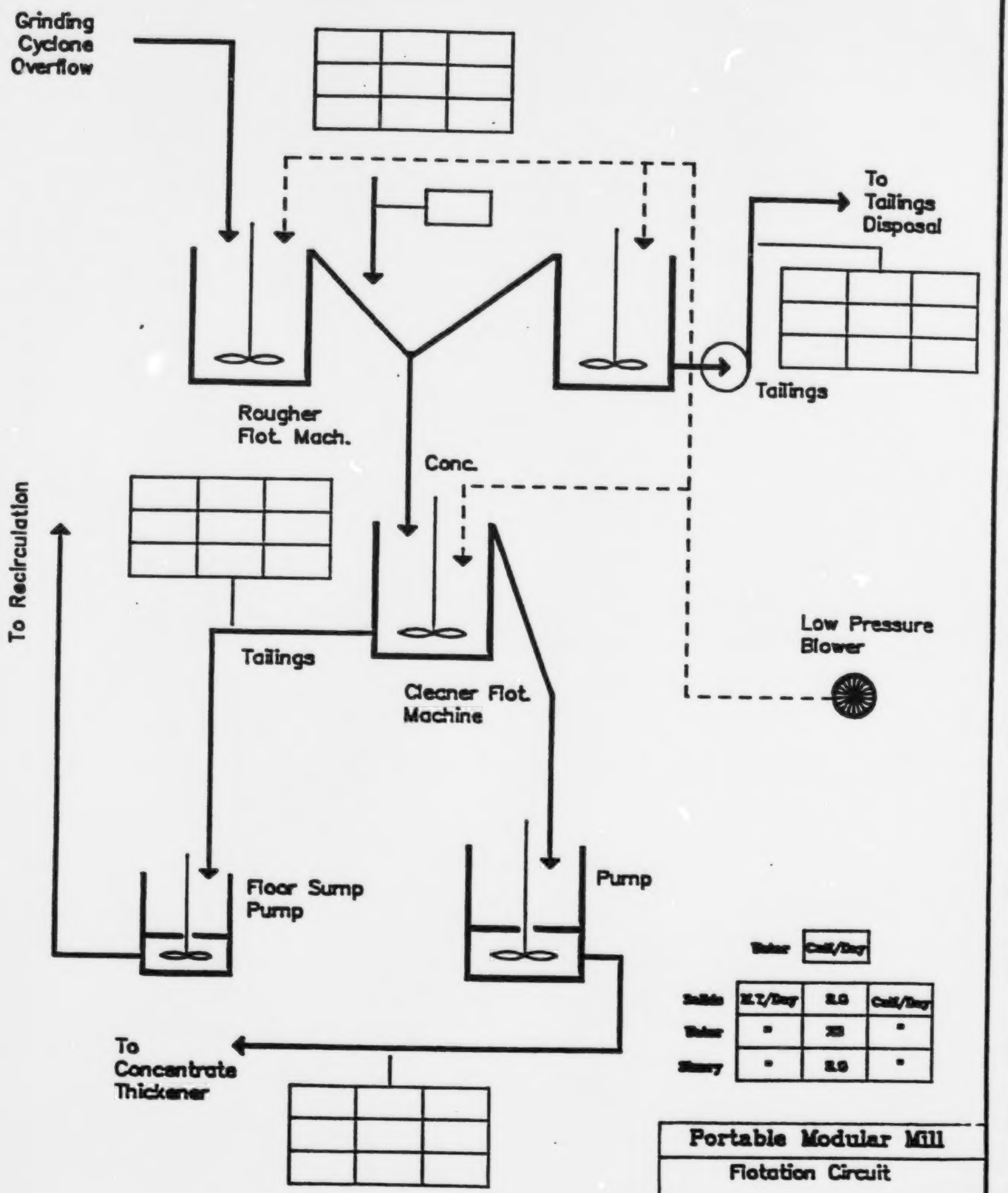

Grinding Cyclone Overflow
To Tailings Disposal
Tailings
Rougher Flot. Mach.
Conc.
To Recirculation
Tailings
Clecner Flot. Machine
Low Pressure Blower
Floor Sump Pump
Pump
To Concentrate Thickener
Water
Cu.M/Day
Solids
M.T/Day
S.G
Cu.M/Day
Water
Slurry

Portable Modular Mill

Flotation Circuit

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate D-7

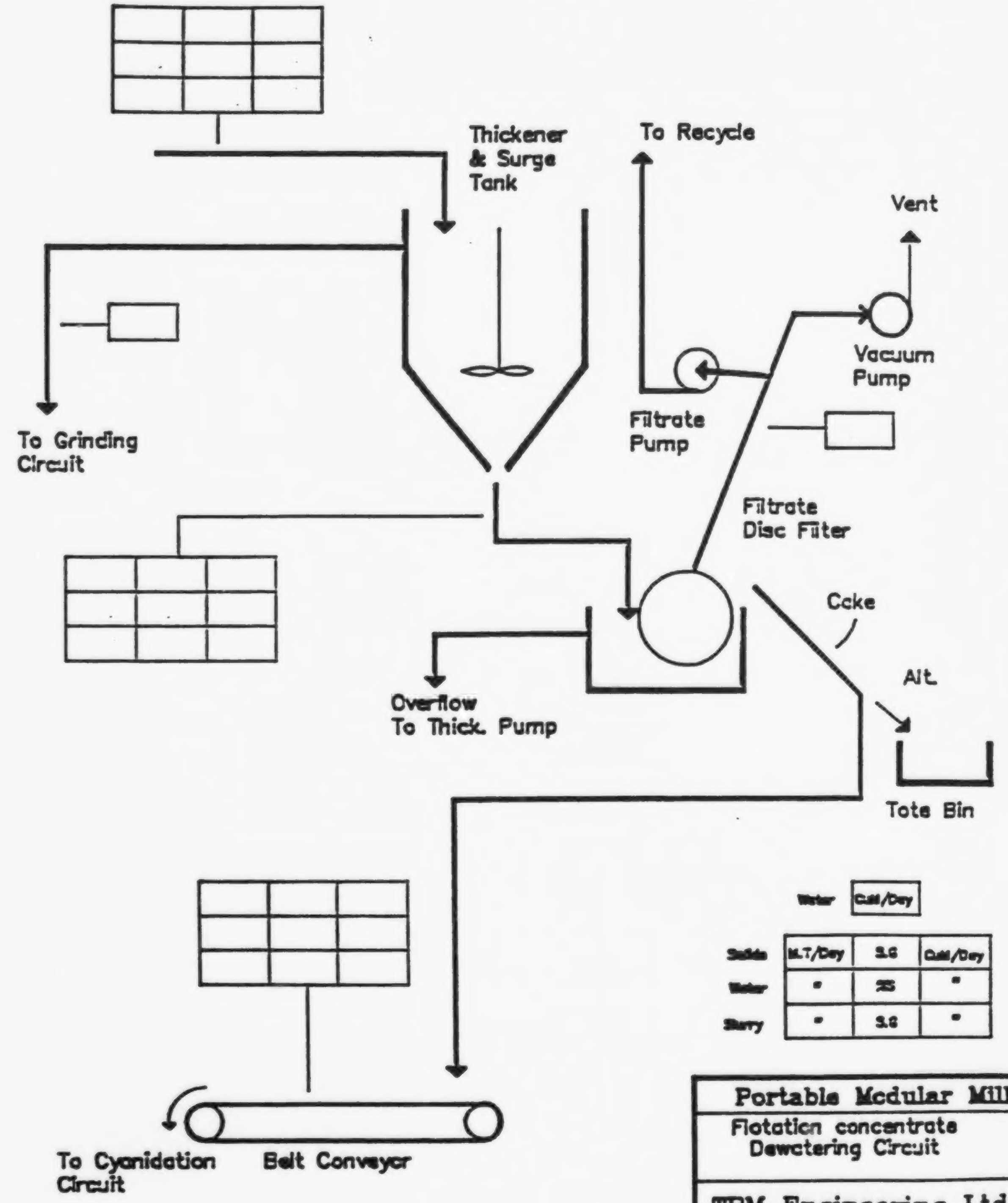

Grinding Cyclone Overflow
To Tailings Disposal
Rougher Flot. Mach.
Tailings
Conc.
To Recirculation
Tailings
Clecner Flot. Machine
Low Pressure Blower
Floor Sump Pump
Pump
To Concentrate Thickener
Water Gall/Day
Solids M.T/Day S.G Gall/Day
Water " S.G "
Slurry " S.G "

Portable Modular Mill

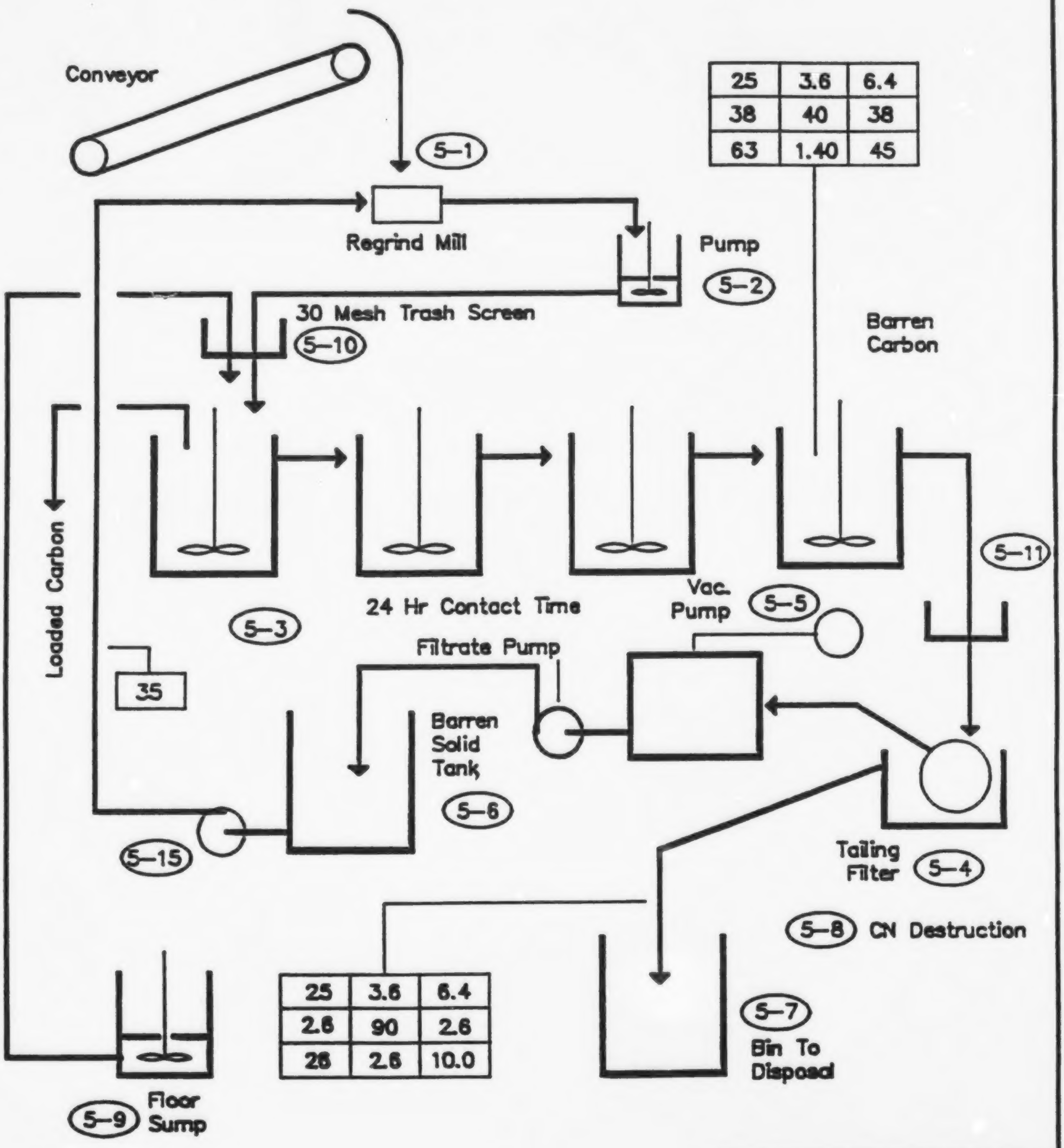
Flotation Circuit

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate D-7


Thickener
& Surge
Tank
To Recycle
Vent
Vacuum
Pump
To Grinding
Circuit
Filtrate
Pump
Filtrate
Disc Filter
Cake
Alt.
Tote Bin
Overflow
To Thick. Pump
To Cyanidation
Circuit
Belt Conveyor
Water Cu.M/Day
Solids M.T/Day S.G Cu.M/Day
Water * 25 *
Slurry * S.G *

Portable Modular Mill	
Flotation concentrate Dewatering Circuit	
TRM Engineering Ltd.	
Scale	Date
G Hawthorn	Plate D-8


Conveyor
5–1
Regrind Mill
Pump
5–2
30 Mesh Trash Screen
5–10
Barren
Carbon
Loaded Carbon
5–3
24 Hr Contact Time
Vac.
Pump
5–5
5–11
Filtrate Pump
35
Barren
Solid
Tank
5–6
5–15
Tailing
Filter
5–4
5–8
CN Destruction
5–7
Bin To
Disposal
5–9
Floor
Sump

25	3.6	6.4
38	40	38
63	1.40	45

25	3.6	6.4
2.6	90	2.6
26	2.6	10.0

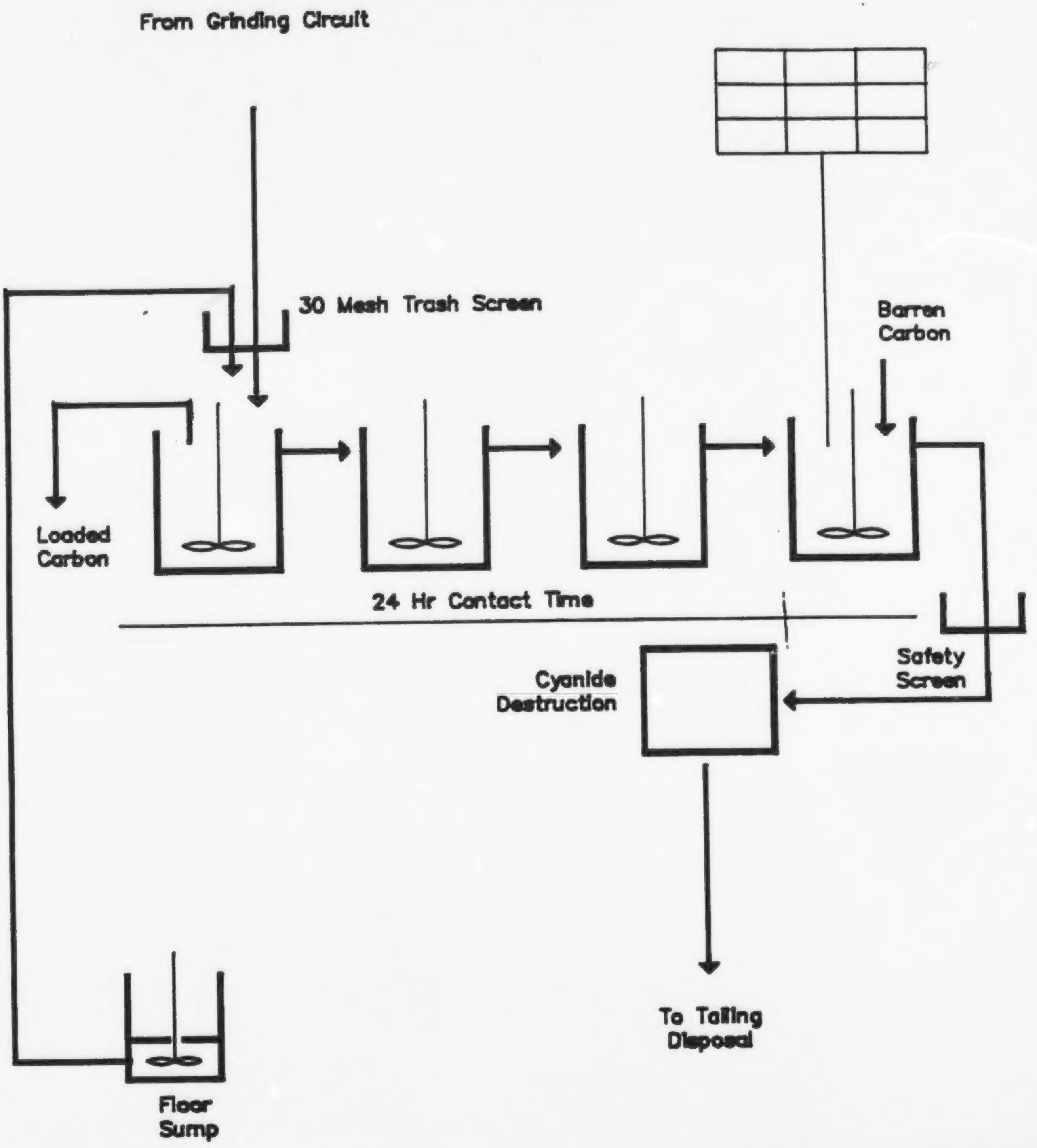
Portable Modular Mill

Cyanidation Circuit

(FLOATATION CONCENTRATE)

TRM Engineering Ltd.

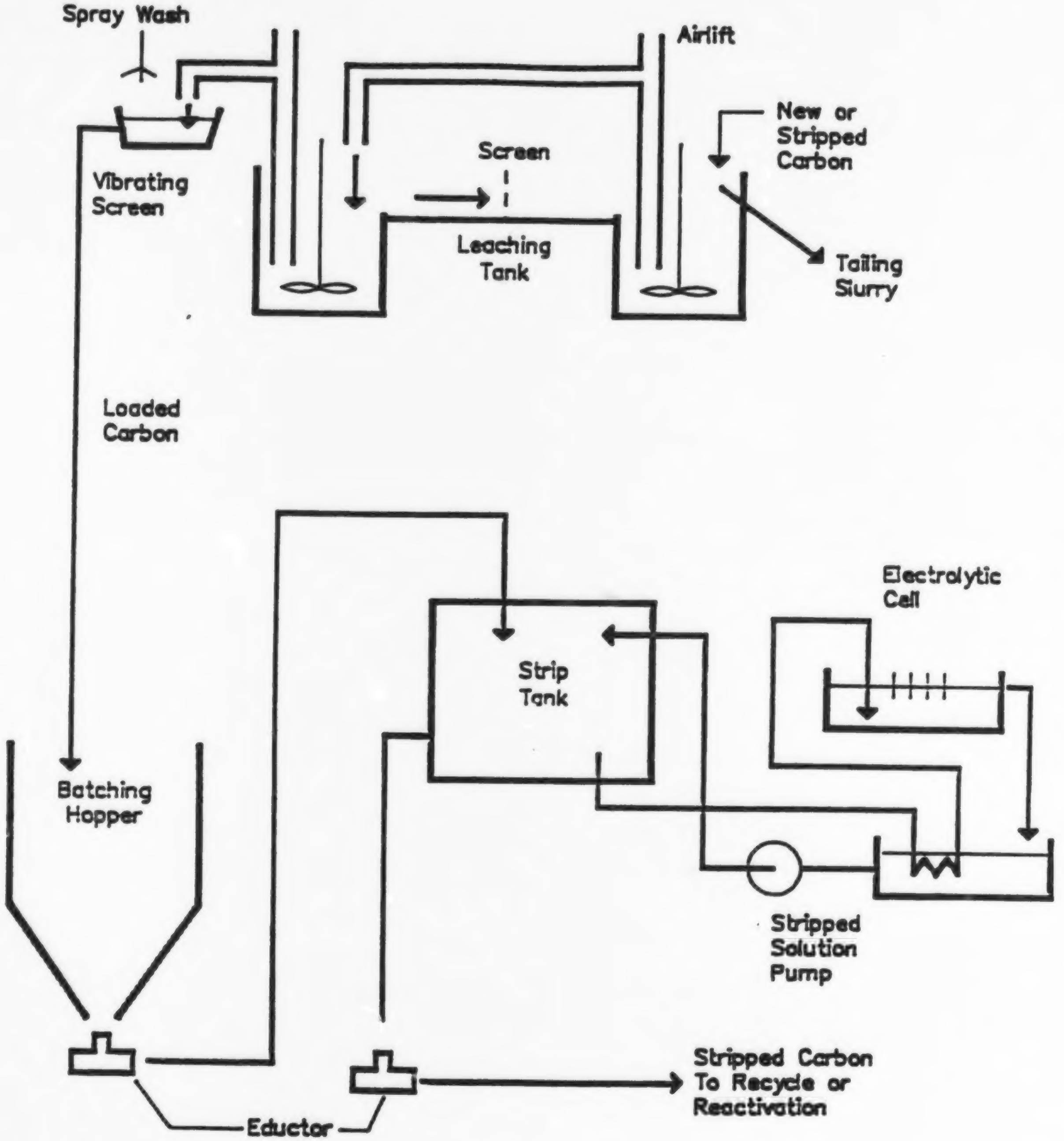
Scale	**Date**
G Hawthorn	**Plate** D-9


From Grinding Circuit
30 Mesh Trash Screen
Barren Carbon
Loaded Carbon
24 Hr Contact Time
Cyanide Destruction
Safety Screen
To Tailing Disposal
Floor Sump

Portable Modular Mill
Cyanidation Circuit

TRM Engineering Ltd.

Scale	Date
G Hawtham	Plate D – 10


Spray Wash
Airlift
New or Stripped Carbon
Screen
Vibrating Screen
Leaching Tank
Tailing Slurry
Loaded Carbon
Electrolytic Cell
Strip Tank
Batching Hopper
Stripped Solution Pump
Stripped Carbon To Recycle or Reactivation
Eductor

Portable Modular Mill

Carbon Circuit

TRM Engineering Ltd.

Scale	Date
G Hawthorn	Plate D – 11

APPENDIX E

SUPPLEMENTAL NOTES

CRUSHING EQUIPMENT

The purpose of the crushing plant is to reduce the size of the as-mined ore so that it can be fed to the subsequent grinding circuit.

Under ideal conditions, a single jaw crusher can accomplish this objective, although it is much more common to require a two-stage system.

Ideally, the feed opening of the primary crusher will be sufficiently large to accommodate the coarsest rock from the mining operation.

Unfortunately, almost no matter how large the primary crusher opening, eventually or frequently, the ore will contain oversize material. Those pieces which are obviously oversize will be reblasted in the mine, but near-size rock will be sent to the crushing plant where it may have to be rehandled.

This difficulty is overcome in small crushing plants by one of:

-- installing a grizzly (coarse stationary screen) on top of the coarse ore bin, and periodically sledging oversize;

-- expecting to do some blasting in the crushing plant;

-- sledging oversize at the first crusher;

-- discarding, at least temporarily, oversize from the primary crusher feeder or feed conveyor.

In the 1930s-50s, many of the small tonnage plants operated quite successfully with a single jaw crusher positioned so that ore fed by gravity from the coarse ore bin, through the crusher directly to the fine ore bin.

This type of very simple crushing plant is feasible where:

-- the mine production is essentially all -225 mm (9");

-- minus 25 mm (1") ball mill feed is acceptable;

-- the ore does not contain cohesive clay or snow, which will plug the crusher.

The fineness of the crushing circuit product is critical, since the feed to the grinding circuit must be sufficiently fine to prevent an excessive amount of oversize rejects at the discharge end of the grinding mill. "Excessive" is defined as the condition where the operator reduces the plant feed rate due to what he considers to be excessive wheelbarrowing of oversize.

Generally, a crushing plant product of -12 mm (1/2") is acceptable ball mill feed. Occasionally, a highly friable ore, i.e. one which has a high sulphide content, can be successfully ground from a very coarse, 25-30 mm (1.0-1.25") feed.

If the mine production is coarse and the ball mill feed needs to be fine, a 2 stage crushing system will be required.

If there is no clay or other cohesive component, options 1 and 2 are normally acceptable.

Options 3 and 4, although much more costly to install than 1 or 2, are imperative if the ore contains clay or snow, since either will cause packing in the secondary crusher. This condition seriously reduces the throughput rate.

For a small plant up to 100 tpd, crushing 1 shift/day, a 2 stage open-circuit jaw crushing plant as shown in option (1), will normally be quite satisfactory.

In specifying the secondary crusher, any one of jaw, cone, or rolls crusher is technically acceptable.

A rolls crusher, in spite of its simplicity, requires regular welding to maintain the crushing surfaces. Since this work is tedious, it tends not to be adequately performed. This inevitably reduces the capacity of the grinding circuit.

A cone crusher, although an excellent secondary crushing machine, has the following characteristics:

- -- higher capital cost;
- -- more difficult liner replacement than jaw crusher;
- -- somewhat lower mechanical reliability;
- -- poor availability of small cone crushers;
- -- greater overall height.

COMPONENT SELECTION

Bins

The selection of both the coarse and fine ore bins represents a compromise among:

- -- minimizing capital cost;
- -- minimizing, but not eliminating, the risk of running out of feed for the grinding circuit;

-- efficient utilization of labour and mobile equipment.

In virtually all underground mining operations, the mine itself will operate discontinuously, i.e. 1 or 2 shifts/day, 5 days/week, and the grinding circuit will operate continuously, i.e. 24 hours/day, 5 or 7 days/week.

It is therefore apparent that there must be sufficient surge capacity in the ore supply system to maintain steady feed to the grinding circuit. This can be provided at one or more of the following locations:

-- a coarse ore stockpile adjacent to the crushing plant;
-- the coarse ore bin;
-- a fine ore stockpile adjacent to the fine ore bin;
-- the fine ore bin.

Crushers

Jaw crushers are available on both single and double toggle configuration. The former type is mechanically more robust, but are less readily available than single toggle crushers.

Jaw crushers are always fitted with a sacrificial toggle, which will break if malleable material (i.e. a loader tooth adapter) is fed into the crusher. One of the following precautions should therefore be practiced:

-- install a magnet ahead of the first crusher;

-- install a metal detector ahead of the first crusher;

-- station an operator ahead of the first crusher;

-- stock at least 2 spare toggles, and know where replacements are readily available. This should be done in any case;

-- DO NOT FABRICATE TOGGLES OUT OF STEEL PLATE, SINCE THIS MAY BREAK SOMETHING EXPENSIVE.

In many small plants, which have no location for a magnet ahead of the crusher, it is frequently less expensive to replace the occasional toggle than to provide the protection.

In the proposed two-stage jaw crushing plant, it may be prudent to install a small magnet ahead of the second crusher, since it will have a very small setting of . 12 mm (1/2").

Conveyors

Depending upon the site, up to 3 belt conveyors will be required to transport the ore through the crushing plant.

Industrial quality conveyors with a minimum width of 450 mm (18") should be selected. This width, although oversize for the crushing rate of 10-15 tph, will minimize spillage cleanup.

A 600 mm (24") wide conveyor is frequently more readily available than 450 mm, will also be satisfactory and may even be less expensive.

Provincial safety regulations require the installation of safety pull cords for emergency stopping.

Conveyor belting may be joined by: vulcanizing, mechanical fasteners, or cold splicing (gluing). For a small operation, fasteners are a good choice, since the procedure is easily learned and the fasteners are inexpensive.

Conveyor skirting, for spillage protection, should be constructed of 12 mm (1/2") skirt board rubber. The use of old belting should be avoided since the fabric reinforcing will trap mineral particles which will abrade and destroy the conveyor.

Ideally, the conveyor will be driven by a shaft-mounted speed reducer. These units are far less expensive to install than right angle drives and avoid the use of roller chains which, unless totally enclosed, have a short life expectancy.

Inclined conveyors will run backward if shut down under load - unless a backstop is incorporated into the drive. These are a good investment and should be installed on all inclined conveyors.

Vibrating Screens

In large crushing plants, vibrating screens are frequently used to size the final product of the plant. This practice is justifiable since it decreases the amount of material which has to pass through the secondary or tertiary crusher, and usually permits the installation of a smaller crusher than would otherwise have been selected.

In small crushing plants, the smallest crushing components generally have more capacity than the designed feed rate of the plant.

A small crushing plant can often be confidently designed and operated using either a single or two-stage circuit without any screening. This condition will arise if:

-- the ore does not contain clay or any other cohesive component;

-- there is NO snow in the ore;

-- it is not excessively wet;

-- it is not frozen.

All other ore conditions necessitate the installation of a vibrating screen ahead of the secondary crusher. This screen may be operated in open- or closed-circuited configuration.

For most small plants, a single deck screen is satisfactory. Typically, the screen cloth will be woven wire construction with slotted openings, say 8 mm (3/8") or smaller * 40 mm (1.5").

An inventory of replacement screen cloth (typical life expectancy is 1 month) and rubber support bars should be maintained.

Normally, a screen deck is sized with an allowance of 0.1 sq. m. (1 sq. ft.) for each 1 tph (tonne per hour) of throughput.

The screen can be expected to be the greatest source of dust loading in the entire operation, and should therefore be well enclosed.

Dust Collection

In all likelihood, dust will be produced at the following locations:

- -- the screen;
- -- the crushers;
- -- all conveyor transfer points.

Occasionally, the ore will be sufficiently wet or water can be added to suppress most of the fugitive dust. However, no crushing plant should be operated without a dust collecting system which will both remove dust at its emission point, and clean the air before exhaust.

Several types of dust collecting systems are available:

- -- bag house, which uses a fabric filter to remove suspended solids;
- -- wet scrubber, in which the dust-laden air is passed through a curtain of water;
- -- impingement scrubber, in which water is sprayed into the eye of the dust collecting fan.

GRINDING

The purpose of the grinding circuit is to complete the comminution of the ore which was started by the crushers. The grinding mill(s) and associated classfier are sized so that ore will be broken sufficiently fine to liberate the valuable constituent(s) but not so fine as to impair its recovery.

In virtually all concentrating plants with capacities of less than 150 tpd, a single-stage ball mill circuit is utilized.

Grinding mills up to 1.8 m (16') diameter can generally be truck-transported fully assembled, provided the grinding charge is dumped from the mill. A 1.8 m diameter x 2.4 m long (6 x 8') mill will consume 125 HP and is capable of processing 100-150 tpd.

Although an oversized grinding mill can be operated at reduced capacity merely by decreasing the quantity of grinding media, this is usually a poor trade-off in energy consumption. Since the grinding mill is the largest consumer of power in the plant, it should be carefully sized so that it will successfully perform its design requirement without the expense of wasted energy.

Any of the grinding mills installed in the modular mill should be closed-circuited with a cyclone to size the product.

COMPONENT SELECTION

Fine Ore Feeder

For the ball mill to produce consistent quality feed for the recovery circuit, it is essential that the feed rate be well controlled. This is easily accomplished by discharging ore from the fine ore bin onto a slow moving (5-8 m per minute) belt conveyor. The feed rate can be controlled by adjusting the feed opening or varying the conveyor speed.

Grinding Mill

As a rule-of-thumb, 0.9 tpd of ore is processed for each 1 HP of power consumed, i.e. a mill which consumes 100 HP will generally produce 90 MTPD (100 STPD) of feed for the recovery circuit.

Caution should be exercised when determining grinding mill powers to differentiate between installed and operating power. Older grinding mills are frequently driven by a motor which is beyond the power consuming capability of the mill itself. Reference should therefore be made to suitable texts to determine the actual power consumed.

The larger series of small grinding mills (+75 HP) are frequently driven by directly coupled wound rotor motors. These motors are very reliable, but the older type of switchgear (manual stepping starters) tends to be abused, and perhaps should be replaced with the modern autotransformer type. These are expensive but very reliable.

The very smallest mills are typically driven by a conventional, totally enclosed, fan-cooled (TEFC) motor through a V-belt drive. This arrangement is good since it uses readily available motors and switchgear.

Occasionally, a used grinding mill will be driven by a directly coupled motor and air operated clutch. This configuration is effective but does require a supply of air to engage the clutch.

Since ease of transportation is an important consideration for the modular mill, an important feature of the grinding mill is its compactness or ease of disassembly and reassembly for transportation.

Many of the smaller concentrators use rubber liners in their grinding mills. The principal reason for their selection is the ease of handling lightweight rubber components as opposed to cast iron/steel. This feature can frequently reduce the relining time by 50%.

Classifiers

Before the ground ore leaves the grinding circuit, it is important that it be sized to avoid passing either too coarse or too fine material to the recovery circuit.

This is accomplished by installing a classfier in closed-circuit with the grinding mill.

The most commonly used classifier is the hydrocyclone (cyclone). These units are effective, inexpensive, and do not take up any floor area.

Occasionally, mechanical classifiers of the rake, bowl, or spiral type are available, but are rarely a good buy because of their large dimensions and periodical heavy maintenance.

Pumps

A a pump is required to feed the cyclone.

The pump should be a horizontal rubber-lined type. Many manufacturers supply good units and the only consideration is the price of the pump and spare parts.

The popular SRL (sand rubber lined) pump, which is manufactured by both Allis Chalmers and Denver Equipment, has undergone several revisions. Caution should therefore be exercised in purchasing more than one pump to ensure that the parts are interchangeable.